UNITIL ENERGY SYSTEMS, INC

DIRECT TESTIMONY OF
JUSTIN C. EISFELLER

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION
DE 09-___
AUGUST 5, 2009

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LIST OF SCHEDULES

I. INTRODUCTION

Q. Please state your name and business affiliation.

A. My name is Justin C. Eisfeller and I am the Director of Energy Measurement and Control at Unitil Service Corp., and I am testifying on behalf of Unitil Energy Systems, Inc. ("UES" or the "Company"). As Director of Energy Measurement and Control (EM&C) I am responsible for daily operations of the metering, substation, and gas and electric dispatching areas. These responsibilities have involved shaping the company's direction in areas of advanced metering applications and regulatory actions due to EPACT and distributed generation. My business address is 325 West Road, in Portsmouth, NH.

Q. Please summarize your qualifications and current position with the company.

A. I joined Unitil in 2003 as Manager of Distribution Engineering with responsibility for distribution system design and support. In 2004, I assumed the responsibilities of Director of Engineering with responsibilities for distribution engineering, planning, transmission and substation engineering, system protection and control, computer aided design, and geographic information systems. In 2008 I assumed responsibilities for my current position. The functions of the Director, EM&C include responsibility for the installation, operation, and maintenance of equipment necessary to provide for metering, dispatching and substation systems; as well as equipment and systems necessary for the implementation of new energy technology, the digitization and automation of the electric system, equipment communications, system performance data gathering, demand response, and the enabling of other displacement energy technologies. Metering functions include installation, maintenance, and testing of all gas and electric meters; monthly procurement of energy usage data; development of metering system standards to optimize efficiency and performance; and the procurement, maintenance, enhancement of automated meter reading systems (AMI systems). System Dispatch includes radio operation; outage reporting; system monitoring & control (SCADA systems); and ISO reporting of regional operating procedures. Gas functions include load forecasting, daily nominations, tracking of gas inventories, daily estimates and telemetering of daily readings for gas suppliers. System operations functions includes substation equipment installation and maintenance; system switching, emergency restoration efforts; and management of a predominantly union workforce.

Prior to joining Unitil, I was employed for 6 years at Heidelberg Web Systems, as Director, Product Performance Group, with primary responsibility for overseeing engineering support for service operations and product upgrades. Prior to this experience, I worked for Public Service Company of New Hampshire ("PSNH") for 10 years where I held various positions of increasing responsibility within their engineering departments.

Q. **What is the purpose of your testimony?**

A. In this testimony I will describe Smart Grid Time of Use DER Project - Pilot Phase, which UES plans to complete during 2010. I will also demonstrate that based upon our cost/benefit analysis including an assessment of environmental and economic impacts, this project meets the public interest test as defined in RSA 374-F.

II. TIME OF USE/ SMART GRID PILOT

Q. Please provide a summary description of the proposed Time of Use/Smart Grid pilot project.

A. I have attached Schedule JE-1 which provides a detailed description of this pilot project as originally filed with the Massachusetts Department of Public Utilities in April 2009. In summary, the Time-of-Use/Demand Response (TOU/DR) Pilot Program is designed to investigate the costs and benefits associated with three distinct demand reduction programs. Two of these programs will investigate TOU rates incorporating low, medium and high-cost time based rates with a critical peak price (CPP) that can be initiated during periods of extreme electricity demand. The third program is a non-TOU program that entails a utility-controlled thermostat that requires no intervention from the customer. Each of these programs is described briefly below. The pilot will be conducted jointly in Unitil's Massachusetts and New Hampshire service territories in order to achieve maximum efficiency at the lowest cost to the ratepayers of either state.

- Simple TOU Program – Enrolled customers will receive basic educational materials, with no technology enhancement. CPP notification will be handled via email or a phone call. The simple rate will not include a time-of-use rate structure. Comparisons in demand reduction and implementation costs between the three programs shall be made.

- Enhanced Technology Program – Enrolled customers will receive the same educational materials, but will also receive an in-home wireless control system with a suite of energy management tools, a utility integration portal, and flexible control devices (smart thermostats and outlets). This package will allow for both utility and customer-automated load control and demand response. The *Enhanced Technology Program* will not include direct demand control from UES through the customer's thermostat.
- Smart Thermostat Program – This is not a TOU rate program. Instead, enrolled customers will receive a utility controllable thermostat that offers digital programming features and customer feedback. The utility will have the ability to either cycle the customer's heating and cooling load, or change the temperature on the thermostat during periods of extreme electricity demand. This change in thermostat setting will not be accompanied with specific customer notification, but customers will be able to override the changed setting.

Phase I of this pilot entails establishing sample sizes for each of the above three programs (and a "control" group), developing educational materials, and coming up with a marketing and recruiting approach that minimizes non-response bias. Guidance will also be provided as to the best methods for implementing the pilot in a way that will allow the project objectives to be met. A primary project objective is to obtain information that can be used to inform price elasticity models. Phase I will ultimately deliver an approach for fully implementing the pilot in Phase II.

The information contained in Schedule JCE-1 will be updated once the pilot program has been approved in MA and NH. In particular, additional analyses and rate design work will be required to complete the design of the TOU rates, and the TOU Tariff and Rate Schedules will need to be finalized and approved by the commissions.

Q. **Please explain why UES considers this a DER project?**

A. The primary objective for this project is to provide consumers with more accurate pricing information so that they may better allocate their limited resources as they make their purchasing decisions. Additionally, this pilot will demonstrate technologies and processes that can save consumers real dollars by shifting demand from peak to off-peak periods. Consumer savings are derived from both lower priced generation and the avoidance of transmission and distribution investments driven by rising peak demands. We believe that this project will have a direct impact

on our ability to achieve system reliability and security by deferring the need to add new T&D infrastructure through load management via time of use applications.

Q. **What is the estimated cost for this DER pilot project?**

A. A detailed cost breakdown for this project is included in Schedule JCE-1 Appendix A. As noted above, this pilot is being implemented by Unitil in both its New Hampshire and Massachusetts electric distribution service areas. Overall pilot costs are split evenly between the companies. The actual customer equipment installations will be greater in New Hampshire, however, corresponding to the larger number of customers, so those costs are allocated on the number of participating customers, resulting in a slightly higher cost allocation to New Hampshire. In addition, these cost estimates exclude internal personnel and overhead costs, as we wanted to insure that no costs included for recovery in the pilot program were also, arguably, being recovered in the Company's base rates in either state.

The total cost for the pilot project, consistent with those assumptions, is estimated at $526,560, with the share for New Hampshire estimated at $312,136. This excludes internal personnel costs or overheads.

Q. **How did you derive the economic and environmental benefits associated with this pilot project?**

A. Schedule JCE-2 is a summary report of the economic and environmental impact assessment performed for this project. Load and energy impacts were estimated by GDS Associates, the company assisting UES in the development of this pilot project, based on utility experience derived from other TOU programs.

We analyzed the economic and environmental benefits using the same model introduced by Dr. Axelrod. Overall, the project has a Benefit/Cost (B/C) ratio of 1.80. In other words, there are $561,000 in total savings for UES' New Hampshire customers derived from the $312,000 initial cost. While the participating customers will reap over $268,000 in benefits, all customers benefit from $292,000 in benefits. The B/C ratio for all non-participating customers is .94. We believe this is an excellent result for a pilot program.

Q. **Are there other tangible benefits that can be derived from this pilot project?**

A. Annual energy savings amounts to 56 megawatt hours per year. Associated with this reduction is also a reduction in air quality emissions. More significantly, as loads are shifted from on-peak to off-peak periods, more efficient and less polluting generation is called upon. Over the life of this project, some $16,000 dollars will be avoided in CO_2 charges. We also estimate that the economic development benefits will result in 3 new jobs and $116,000 in added wages and salaries within the region. Based on the economic multiplier effect that Dr. Axelrod discussed in his testimony, UES' $312,000 investment in the TOU Pilot project will produce nearly $300,000 in regional economic output.

Q. **Why do you believe the Commission should approve a project with a B/C ratio that is less than one?**

A. We believe that our estimates for lifetime benefits are very conservative, and that future benefits, especially those associated with environmental costs, will likely result in a B/C ratio of greater than one for UES' non-participating customers. For example, avoided CO_2 emissions are priced at the current RGGI auction rates. A national cap and trade program, if instituted, could result in avoided CO_2 emission fees between 5 and 10 time greater. Note that we estimate that this project will produce some $16,000 in lifetime CO_2 benefits based on RGGI prices (between $3 - $4/ton). Some economists project CO_2 prices in the $20 - $30 range, which would increase this benefit alone to more than $120,000.

We also believe the demand impact will increase as customers and technologies catch up to concept of time of use pricing. For example, a part of this pilot is an enhanced technology study where remotely transmitted pricing signals can automatically trigger demand responses without the customer's intervention.

Furthermore, this pilot project incurs a number of expenses designed to test systems and evaluate customer responses. For example, UES is purchasing additional metering just to quantify direct and immediate reactions to price signals and technology applications. Under a full scale program, such expenses will be minimal as compared to total project costs, as UES' current AMI system is fully capable of implementing TOU rates without additional expense.

III. CONCLUSION

Q. **Does that complete your testimony?**

A. Yes, it does.

Summary Report
TOU

Unitil Investment	$312,136
Total Project Cost	$312,136
Other Intangible Benefits	
Load Reduction	
Summer	155
Winter	155
Lifetime	1,550
MWh Saved	
Annual	56
Lifetime	558
Economic Development	
Jobs Created	3
Wages & Salaries	$116,466

Allocation of Economic Benefits

Capacity	Total	Participant	All Customers	Default
Generation				
Summer	$153,817	$153,817		
Winter	$0	$0		
Transmission	$18,112	$18,112		
Distribution	$55,880	$55,880		
DRIPE	$40,713		$40,713	
Localized Distribution	$12,814	$12,814		
Total Capacity	**$281,336**	**$227,809**	**$53,527**	**$0**
Energy				
Winter				
Peak	$11,619	$11,619		
Off peak	$8,543	$8,543		
Summer				
Peak	$11,925	$11,925		
Off peak	$8,245	$8,245		
Total Energy	**$40,331**	**$40,331**	**$0**	**$0**
Other				
Energy				
Dripe	$7,599	$7,599		
Non-Electric				
CO2 Reduction	$16,211	$16,211		
REC Credit	$0	$0	$0	
Total Other	**$23,810**	**$0**	**$23,810**	**$0**
Economic Development				
Total Output	$215,146	$215,146		
Total Benefits	$560,623	$268,140	$292,483	$0
B/C Ratio	1.80	n/a	0.94	

Unitil
Unitil Service Corp.

March 31, 2009

BY OVERNIGHT MAIL and ELECTRONIC FILING

Mary L. Cottrell, Secretary
Massachusetts Department of Public Utilities
One South Station, 2nd Floor
Boston, MA 02110

RE: Fitchburg Gas and Electric Light Company, d/b/a Unitil
Smart Grid Pilot Program Development Plan
Docket: DPU 09-31

Dear Secretary Cottrell:

Pursuant to Section 85 of the Green Communities Act, Chapter 169 of the Acts of 2008, and on behalf of Fitchburg Gas and Electric Light Company, d/b/a Unitil ("Unitil" or the "Company"), enclosed please find the Company's Smart Grid Pilot Program for filing in the above-referenced docket. Hard copies of this filing are being provided by overnight-delivery.

If you should have any questions, please do not hesitate to contact me directly. Thank you for your consideration in this matter.

Sincerely,

Gary Epler
Attorney for Fitchburg Gas and
Electric Light Company

Enclosure

cc: Jed Nosal, Assistant Attorney General (3 copies)
Robert Sydney, Senior Counsel DOER

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Fitchburg Gas and Electric Light Company

d/b/a Unitil

Smart Grid Pilot Program

April 1, 2009

Docket No. DPU 09-31

Filed with the Massachusetts
Department of Public Utilities
April 1, 2009

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I. Introduction

Section 85 of the Green Communities Act requires electric utilities to develop and file with the Department plans for two specific pilot programs:

> 1) a proposed plan to establish a smart grid pilot program utilizing advanced technology to provide real time measurement and communication of energy consumption, automated load management, remote system status and operation of distribution system equipment; and
>
> 2) a proposal to implement a pilot program that requires time of use or hourly pricing for commodity service for a minimum of 0.25 per cent of the company's customers.

Fitchburg Gas and Electric Light Company's d/b/a Unitil ("Unitil" or "Company") Automated Metering Infrastructure (AMI), with its advanced metering and two-way communication capabilities, already meets much of the functionality specified for the smart grid pilot. The combination of two-way communication capability and reprogrammable endpoints, permits the Company to implement time-of-use (TOU) and critical peak period (CPP) rate designs without the need for costly meter change-outs.

Although Unitil plans a multi-year effort to expand the use of its AMI system, it expects to take a measured approach to investigating smart grid technologies and program development. As discussed herein, the Company has designed its pilot programs to incorporate the advanced features of its AMI system in such a manner as to satisfy both of the pilot requirements under the Green Communities Act. In Section II.A. of this filing, Unitil addresses the first provision above for a smart grid pilot program. This section also discusses the Company's plans for expanding the use of its AMI system in the near future.

In Section II.B., Unitil addresses the second provision concerning a time of use pilot program. It should be noted that the time of use pilot has been designed as a joint pilot of both Unitil and its NH affiliate, Unitil Energy Systems, Inc. ("UES"), to include customers of both utilities. The proposed joint pilot was designed to ensure statistical validity of the program results while providing for lower costs by reducing the required number of customer participants for each company and for the sharing of common costs between companies. If, however, UES is unable to obtain regulatory approval in New Hampshire on the same terms and in the same time frame as is obtained by Unitil from the Department, Unitil will nonetheless proceed with its portion of the pilot as approved. In that circumstance, however, Unitil will seek to recover the portion of costs which would no longer be shared by its New Hampshire affiliate.

II. Program Description

A. AMI as a Smart Grid Platform

A.1 Advanced Metering Infrastructure System

Unitil's AMI system is a platform for intelligent grid projects, since it provides for two way communications with the meter and other field devices, is capable of gathering system performance data at every meter, and can be easily integrated with other systems.

The AMI system utilizes ultra-low bandwidth, power line carrier signals and parallel frequency communications for simultaneous communication with all meters. Data is transmitted to a server with router capability located at substations. The data is then transmitted by telecommunication lines to Unitil's centralized server room in Hampton, New Hampshire, where it is made available across the Company's information network to all of the operating centers for billing, status monitoring, or analysis. The Company views the AMI system as offering a strategic platform for additional technological, management, and evaluative capabilities, including:

(1) better estimating load shapes and peak load conditions of specific circuits;
(2) on-demand meter reads;
(3) remote "virtual" access (e.g., for disconnections and reconnections);
(4) electric system monitoring, including load, voltage, reliability, power quality, outage detection, and management;
(5) remote configuration of demand meters and TOU meters; and
(6) distribution automation.

Most importantly, AMI can serve as the platform for demand-response and TOU programs that will encourage resource conservation and offer other benefits relating to energy delivery and customer empowerment via informed energy usage choices.

The Company anticipates the next phase of the AMI project (beyond automated meter reading), expected to take place over the next three to five years, will involve integrating the AMI system with other Company systems and expanding the AMI system capability through additional investments. This future evolution of the AMI system is part of the Company's larger strategy to develop and implement elements of what has become known in the industry as the "Smart Grid." The Company is proposing two smart grid pilot projects outlined herein that leverage the AMI system's capabilities and is pursuing additional planned smart grid projects as part of its normal course of business.

A.2 Unitil Vision of Smart Grid

A.2.1 Conceptual Framework

Grid modernization has emerged as an important element of national energy policy in recent years in conjunction with new priorities aimed at improving the cost, efficiency, reliability, independence, and environmental friendliness of the nation's energy supply. Many names have been given to this vision of a modern grid, though the term "Smart Grid" has become most synonymous with a modern 21st century grid that incorporates state of the art technologies to achieve important functional capabilities. While there is no standard definition of a Smart Grid, it is most often described in terms of robust two-way communications, advanced sensors, and distributed computing/control to enable intelligent decisions in order to run the grid more efficiently, reliably and at lower cost. The Smart Grid is also described in terms of its ability to seamlessly integrate energy efficiency, demand response and other distributed-resources and to enable the interaction of loads and resources in real time.

Unitil's AMI system is but one element of a larger vision to achieve the functionality of the modern Smart Grid. The Company envisions a future in which resources are increasingly distributed, with much greater penetration of distributed generation, energy storage, and demand response technologies. A "smart" utility network will have the ability to reduce customer power consumption during peak hours through utility intervention (load control) and/or customer empowerment (demand response), enable grid connection of distributed generation and energy storage devices, and provide grid energy storage and supplemental service for extensive distributed generation load balancing (net metering). These changes will have profound implications for the design of the distribution system.

In order to effectively and efficiently pursue a Smart Grid strategy, it is first necessary to have a clear vision of what the strategy is intended to achieve. A Smart Grid is defined not by specific technologies and features, but by its ability to deliver desired capabilities. In this regard, Unitil has defined its vision of the Smart Grid around the work of the National Energy Technology Laboratory ("NETL") Modern Grid Strategy.[1] The NETL Modern Grid Strategy seeks to revolutionize the electric system by integrating 21st century technology to achieve seamless generation, delivery and end use that benefits the nation. This strategy is then further defined in terms of six key goals, and seven key characteristics that benefit consumers, business, utilities and national security.

A.2.2 Goals and Characteristics of the Modern Grid

The NETL Modern Grid Strategy identifies six key goals of grid modernization in order to achieve the power system required for the future:[2]

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[1] The National Energy Technology Laboratory (NETL), part of DOE's national laboratory system, is owned and operated by the U.S. Department of Energy (DOE). NETL supports DOE's mission to advance the national, economic, and energy security of the United States.

[2] National Energy Technology Laboratory, The Modern Grid Strategy. http://www.netl.doe.gov/moderngrid/

(1) The grid must be more reliable
A reliable grid will provide power dependably, when and where its users need it and of the quality they value.

(2) The grid must be more secure
A secure grid will withstand physical and cyber attacks without suffering massive blackouts or exorbitant recovery costs. It will also be less vulnerable to natural disasters and will recover faster.

(3) The grid must be more efficient
An economic grid will operate under the basic laws of supply and demand, resulting in fair prices and adequate supplies.

(4) The grid must be more economic
An efficient grid will take advantage of investments that lead to cost control, reduced transmission and distribution electrical losses, more efficient power production and improved asset utilization.

(5) The grid must be more environmentally friendly
An environmentally friendly grid will reduce environmental impacts through initiatives in generation, transmission, distribution, storage and consumption.

(6) The grid must be safer
A safe grid will not cause any harm to the public or to grid workers and will be sensitive to users who depend on it as a medical necessity.

The NETL Modern Grid Strategy further defines seven key characteristics of the modern grid. These characteristics represent the NETL's vision, and the desired functionality, for the modern grid.

(1) Self-healing
The modern grid will perform continuous self-assessments to detect, analyze, respond to, and as needed, restore grid components or network sections.

(2) Motivates and includes the consumer
Consumer choices and increased interaction with the grid bring tangible benefits to both the grid and the environment, while reducing the cost of delivered electricity.

(3) Resists attack
The grid deters or withstands physical or cyber attack and improves public safety.

(4) Provides power quality for 21st century needs
Digital grade power quality avoids productivity losses of downtime, especially in digital device environments.

(5) Accommodates all generation and storage options
Diverse resources with "plug-and-play" connections multiply the options for electrical generation and storage including new opportunities for more efficient, cleaner power production.

(6) Enables markets
The grid's open-access market reveals waste and inefficiency and helps drive them out of the system while offering new consumer choices such as green power products. Reduced transmission congestion leads to more efficient electricity markets.

(7) Optimizes assets and operates efficiently
Desired functionality at minimum cost guides operations and fuller utilization of assets. More targeted and efficient grid maintenance programs result in fewer equipment failures.

Unitil uses these goals and characteristics as the framework for its own strategy related to AMI and Smart Grid development, and has been focusing efforts primarily in the areas of customer empowerment and demand response, accommodating generation and other Distributed Energy Resource ("DER") options, and optimizing assets and improving the efficiency of grid operations.

A.2.3 The Role of AMI in Advancing the Smart Grid

The advanced metering and two-way communication capabilities inherent in the AMI system are essential to meeting key functional capabilities and characteristics of the Smart Grid. In particular, the ability to implement time-based rates and demand response programs is essential to motivating and empowering consumers by providing accurate pricing signals as well as choices to increase customer interaction with the grid and thereby reduce consumption.

Future evolutions of the AMI system are expected to include hourly meter intervals, bringing metered consumption closer and closer to real time. Furthermore, meters currently under development will include ZigBee[3] wireless communication capability and the ability to communicate consumption information wirelessly into the home, and to interact with other devices, appliances, and gateways within the home over a Home Area Network ("HAN"). Ultimately, the line between the utility grid and the in-home network will become increasingly blurred as utility meter and equipment providers work together with white goods manufacturers, home energy management and networking solutions providers to develop smart appliances and energy management and demand response solutions incorporating utility consumption information and pricing signals.[4]

In addition to customer empowerment programs, the AMI system provides important functionality to optimize utility assets, improve operating efficiency, and enhance outage restoration, while delivering new and enhanced services to customers. These improvements are

[3] ZigBee is the name of a specification based on the IEEE 802.15.4-2006 standard for wireless personal area networks (WPANs).
[4] The ZigBee Alliance is an association of companies working together to enable reliable, cost effective, low-power, wirelessly networked, monitoring and control products based on an open global standard.

already evident in Unitil's ability to get more timely and accurate readings. The Company has seen a reduction in billing estimates and improvement in on-cycle reads. This performance is expected to further improve with enhancements to the information systems associated with the Company's billing and work order systems. System operations data captured by the AMI system on a daily basis is also being leveraged to improve the design and operation of the system. The AMI system captures outage data, voltage data, and power quality data that are now being incorporated into the planning, design, and maintenance of the system, improving the quality of service. Since this information and customer usage data is available on a daily basis, it can also be utilized to answer customer inquiries regarding billing or outages. The Company has plans to further leverage this data by more closely integrating the AMI system with its billing, work order, planning systems and a future outage management system.

The initial plans to test the functionality, cost effectiveness and potential program development include the two pilot projects outlined below. Additionally, the Company is pursuing several planned projects as part of it normal course of business that further leverage the AMI system.

A.3 Smart Grid Projects

The Company has already completed several AMI initiatives. These projects were outlined in the Companies response to response to the Department of Public Utilities request for a report regarding its plan for the implementation of the next phase of its AMI project.[5] These projects included:

1. End of line voltage monitoring;
2. GIS and AMI system integration for meter communications diagnostics and ability to find loose power connections (potential losses);
3. GIS outage viewer;
4. Improved system modeling data, utilizing per phase and per customer load data from AMI system;
5. Improved service transformer sizing guideline, utilizing the AMI system capability of capturing every customers' daily peak demand;
6. Daily Watt/Var data at step transformers utilizing standard AMI meters; and
7. On demand customer reads and individual outage history to address customer inquiries;

Unitil's plans include a number of other smart grid projects for 2009/10 implementation, including an outage management system that integrates AMI, Interactive Voice Response (IVR), and Geographic Information Systems (GIS) systems; a pilot project to utilize AMI to monitor power quality on the distribution system; and a pilot project that uses the AMI system to control distribution capacitor banks.

[5] See DPU 07-71 at page 44 and August 28, 2008 Unitil response at page 13. Plans outlined also include projects beyond 2010.

The following schedule outlines the timeline for these projects:

Dec. 1, 2009	Outage Management – Phase I (tabular reporting)
Dec. 1, 2010	Outage Management – Phase II (full integration with AMI, SCADA, and GIS
Dec. 1, 2009	Power Quality monitoring with AMI Pilot
Dec. 1, 2009	AMI control of distribution capacitor banks Pilot

A.3.1 Outage Management System

Unitil does not currently have an Outage Management System (OMS). An OMS will provide a means to use real-time information to manage outage related events in a more effective manner and contribute to minimizing the time and costs associated with the outage restoration process. The system will have intelligence to make predictions and decisions based upon the information it obtains. The data management interface will be efficient when collecting outage information in order to provide data for crew management and real time reporting of outage statistics. The system will have two way communication and the flexibility to change when more demands are placed upon reliability management.

An OMS system can use several different data sources to make predictions about the outage size and severity. The data sources can be from customer calls (IVR), SCADA interfaces and /or the AMI system. Since the Unitil AMI system is a two way system capable of communicating outage information, it is apparent that the AMI system may play a key role in the development of an OMS. The continuous monitoring (24 hours per day, 7 days per week, 365 days per year) at every meter point provides valuable information about the status of each and every customer. The AMI system notifies the Command Center within 10 – 20 minutes of an outage. This data may be useful in assessing the situation so that crew dispatch can be completed in an efficient manner to resolve the outage and verify restoration of the area, before the crews move on to another location. This system is able to distinguish between a sustained and a momentary outage based upon predefined, hardwired settings.

An OMS will provide the following benefits:

- Increase reliability and control costs with improved visibility and response time
- Increase return on invested capital by better managing distribution assets
- Provide access to real-time, decision-driving data, thus reducing risk and uncertainty
- Minimize restoration time
- Improve operations efficiency
- Provide ability for segmented or sequential implementation
- Leverage existing systems

A.3.2 Power Quality Monitoring Pilot

Unitil chose to implement the GE kV2c meter for all three phase demand customers. This meter can be upgraded to record power quality information such as voltage and current per phase measurements, voltage sags and swells, voltage distortion, current distortion, and total harmonic distortion. The Company plans to experiment with utilizing the capability of the AMI system to read this information and provide it for analysis of power quality concerns. This pilot would be accomplished with internal Company resources. Therefore there are no incremental costs.

A.3.3 Distribution Capacitor Bank Control Pilot

Unitil is required to maintain its system power factor within the limits set by ISO-NE. This is accomplished through daily capacitor bank switching as well as seasonal switching to address heavier seasonal loading periods. Daily capacitor switching is used as a fine tuning approach to account for daily variations in load cycle while the seasonal switching is required to account for seasonal variations in load. Daily switching is completed through a combination of SCADA controlled and automated capacitor banks switched on time, voltage or power factor.

At the present time, seasonal switching is completed by line crews which are dispatched to place fixed capacitor banks in service. The AMI system is capable of providing some increased level of distribution automation that Unitil does not presently have. The AMI system, with some modifications to the capacitor banks, is capable of switching these banks similar to a SCADA system. Unitil is designing a pilot installation to test the capabilities of this approach. Based upon this pilot, Unitil will determine the cost and benefit of the installation to determine if a larger deployment would be cost effective. If this is effective, it would eliminate a line crew having to switch capacitor banks on a seasonal basis. The cost of the installation is estimated to be $2,000 to $3,000 if the capacitor is already equipped with switches and $8,000 to $10,000 if not. It is assumed that Unitil could implement this with internal resources.

B. TOU / CPP / Demand Reduction Pilot

This section presents the methodology for implementing a demand response pilot program throughout Unitil's service territory. The pilot program has been developed to fulfill the second requirement of Section 85 of the Green Communities Act. The program will ultimately include customers of both Unitil and its NH affiliate, UES; however this submittal focuses on Unitil's customers. The intent of this section is to outline a detailed approach for fully implementing the pilot program.

Unitil has completed a consultant selection process to assist with program development and administration as part of the first phase of the project including: scope development, sampling methodology, marketing and recruitment, and development of educational materials[6]. Unitil will require assistance with the second phase of the project which will include: contractor selection, project management, regulatory support, data analysis and reporting.

B.1 Objective

The primary focus of this pilot program is to meet and exceed the requirements of the Massachusetts Green Communities Act Section 85. Accordingly, a key objective of the pilot is to achieve reductions in peak demand and average load of at least 5 percent for all customers participating in the program. The Company's peak demand normally occurs during the summer months ranging from early June through late August. The pilot is being designed and administered in a manner that will minimize sampling bias and will provide measurable and useful results.

B.2 Pilot Details

B.2.1 Program Overview

This pilot program is designed to investigate the costs and benefits associated with three distinct demand reduction programs. Two of these programs will investigate time-of-use (TOU) rates incorporating on-peak and off-peak periods with a critical peak period (CPP) rate that can be initiated during periods of extreme electricity demand. The third program is a non-TOU program where demand response is achieved through the use of a utility-controlled thermostat. Each program is described briefly below and will be proposed in both Unitil's and UES' service territories.

- *Simple TOU Program* – Enrolled customers will be set up on a time-of-use rate structure and will receive basic educational materials only with no additional enabling technology. Notification of a CPP event will be handled via email, pager, or phone call, based on customer preference.

[6] GDS Associates of Manchester, NH was selected and has made a significant contribution to the development of this filing.

- *Enhanced Technology Program* – Enrolled customers will be set up on a time-of-use rate structure and will receive the same educational materials, but will also receive an in-home wireless control system with a suite of energy management tools, a utility integration portal, and flexible control devices (smart thermostats and outlets). This package will allow for both utility and customer-automated load control and demand response. The Enhanced Technology Program will not include direct demand control by Unitil through the customer's thermostat.

- *Smart Thermostat Program* – Enrolled customers will stay on the existing fixed rate billing structure. Unitil will provide a controllable thermostat that offers digital programming features and customer feedback. Unitil will have the ability to either cycle the customer's heating and cooling load, or change the temperature on the thermostat during critical peak periods. This change in thermostat setting will be accompanied by local notification at the thermostat unit. Customers will be able to override the changed setting.

Customers enrolled in the TOU programs will receive access to a web portal that will provide access to their energy usage (next day daily reads) as well as tools to effectively manage their energy consumption. Pilot participants could use the web portal to experiment with the impact of their daily decisions regarding use of electrical equipment. The web portal will also give participants on the TOU rates the ability to follow their usage during peak times and track the potential cost impacts.

Also anticipated to be available on the web portal will be enhanced web tools and calculators. The web tools and calculators are expected to help Unitil customers identify potential electrical demand savings on a per appliance basis. The web tools are also expected to help TOU rate customers calculate the financial impact of decisions made by reducing demand. The environmental benefits related to emission reductions will also be integrated into the web tools for customers to realize the positive impact on the environment of energy efficiency and load shifting.

In order to calculate per participant load reductions and program savings for peak load and total electric usage, interval data must be collected for program participants and the control group. This requires the installation of interval recording meters. The cost of this equipment and installation is included in the program costs discussed below. Pre and post pilot surveys will be conducted to evaluate customer attitudes and behavior patterns.

B.2.2 Project Parameters

Project Schedule

The following schedule is proposed for the implementation of the pilot program. A key milestone in the program implementation process is the DPU and NHPUC approval of the project by September, 2009. Without timely approval of the project, it will be difficult to initiate the actual pilot program in time for Unitil's 2010 summer peak period.

Aug. 1, 2009	Customer Survey completed (and associated prerequisite materials)
Sept. 1, 2009*	DPU and NHPUC Approval of Pilot Project
Oct. 1, 2009	Completion of RFP for Turnkey Project Completion
Dec. 1, 2009	Award Project Contract
Jan. 1, 2009	Demo Customer Web-Site Available
Feb. 1, 2010	228 Customers Recruited
March 1, 2010	Begin installation of equipment and education of enrolled customers
March 1, 2010	Customer Web-Site completed
May 1, 2010	Installation and training completed
May 1, 2010	Billing System tested and approved
June 1, 2010	Pilot begins
Sept. 1, 2010	Pilot ends
Nov. 1, 2010	Project Report completed

Program Costs

The summary table below presents the cost estimate for the pilot program for Unitil. A 10% contingency has been added to account for variability in equipment and labor pricing, and to account for additional administrative time that may be needed to support the program development. A complete detailed cost matrix including total pilot costs for NH and MA is provided in Appendix A. As shown, equipment and materials are directly assigned based on use (estimated to be 32%) and programming or administrative costs are allocated 50/50.

$81,500	Materials and Installation

$74,000	Project Consulting
$5,500	Participation Incentives
$10,000	Meter Interface and Feeds into the Billing System
$10,000	CIS Billing System
$0	Internal Revenue Reporting
$5,000	Customer Data Management / Internal and External Web
$0	Administration Costs
$18,500	Contingency (10%)
$204,500	**Total**

The cost summary table presented above includes estimates for consultant, contractor and material costs associated with the pilot program in Unitil's service territory. Internal resource costs necessary to support the program are not included. A description of each cost item is provided below:

- Materials and Installation: Materials include analysis meters, Zigbee meters, smart thermostats, enabling technologies, and recruiting and educational materials. Also included is the installation of equipment and training for contractors and customers.

- Project Consulting Fees: Consultant fees to manage the pilot project, provide regulatory support, coordinate contractor outreach and qualification, conduct pre and post pilot surveys, oversee the recruiting effort, manage and analyze the collected data, and prepare a final report documenting the results.

- Participation Incentives: Incentives offered to customers for enrolling in the programs and for completing the pilot period. The need for and magnitude of incentives will be assessed during the marketing surveys.

- Meter Interface and Feeds into Billing System: Includes the planning, design, modification, interface and testing of the meter and billing systems. The smart metering will be an implementation plan to test the data collection, time of use billing interface to automate the billing process and test the reliability of smart meter data collection.

- CIS Billing System: Includes the planning, design, modification, bill printing and testing of the time of use billing process and paper/electronic billing format.

- Internal Revenue Reporting: Includes the planning, design, interface, modification and testing and audit of billing to ensure that all data is tracked and accounted for. Unitil will be using internal personnel for this work.

- Customer Data Management / Internal and External Web: Includes the planning, design, and testing of the web portal for usage information and customer tools posted on the website.

- Administration Costs: Costs associated with maintaining customer relationships and rate management. These are additional internal program cost impacts. Unitil will be using internal personnel for this work.

B.2.3 Sampling Plan

Samples for each element of the pilot will be selected from customer peak and average usage data. Table 1 shows the distribution of total residential customers broken out by state.

Table 1: Total Unitil Massachusetts and UES New Hampshire Residential Customer Breakdown

State	Total Residential		Estimated Residential A/C	
Massachusetts	24,290	27.82%	4,637	23.47%
New Hampshire	63,000	72.17%	15,120[7]	76.53%
Total	87,290	100.00%	19,757	100.00%

The sampling plan is based on two key elements; first, the type of data being measured, and second, the desired level of precision of the estimates developed using the research data. For this project, the type of data being measured is continuous (i.e., in this case - demand savings) rather than proportional (percentage of responses to yes/no or multiple choice type questions). When measuring continuous data, determination of the sample size is based on the estimated statistical variance in the data and the desired level of precision.

The sampling plan incorporates the Green Communities Act specification which requires that the aggregate pilot program samples include a minimum of 0.25% of Unitil's customers (71).

Level of Precision and Sample Size

The sampling plan is designed to achieve precision of 90% confidence with 10% sampling error for each of the three program samples and a control group (four sample groups in all). A sample requirement of 68 customers is estimated for each of the four sample groups to achieve the necessary level of precision.[8] A sample size of 76 customers is proposed to account for expected drop-outs and still achieve the desired confidence levels. If the number of drop-outs in any one sample group exceeds 8, replacement participants should be recruited or the precision of results will be reduced.

Four customer samples will be selected, one for each of the three pilot programs and one for a control group that will be used as a basis of comparison to the pilot project samples. Each sample will contain customers from both New Hampshire and Massachusetts. The purpose of developing samples using customers from both states is to accurately represent the company's entire service area. Unless there are significant differences in energy consumption and peak

[7] Estimate based on data from GDS's 2009 NH Tech Potential Study. Final numbers to be determined from analysis of customer usage records.

[8] Sample size computation based on mean kW savings of **1 kW** with a corresponding standard deviation of **0.5 kW**. The actual sample statistics may vary, but these estimates are reasonable and based on previous GDS consultant work.

demand between Massachusetts and New Hampshire customers, there is no reason to estimate peak kW savings individually for each state. Therefore, final estimates of demand savings and the corresponding confidence bands will represent the total company system. Larger samples would have to be specified to conduct a thorough analysis of demand savings by state. The sample sizes are presented in Table 2.

Table 2: Unitil Massachusetts and UES New Hampshire TOU/DR Pilot Program Sample Sizes

Sample Group	Massachusetts		New Hampshire	
Simple TOU	24	25.0%	52	25.0%
Enhanced Technology	24	25.0%	52	25.0%
Smart Thermostat	24	25.0%	52	25.0%
Control Group	24	25.0%	52	25.0%
Total Received	96	100.0%	208	100.0%

The confidence intervals developed on the final estimated demand savings will be based on the mean and standard deviation of the respective samples. The standard deviation in the measured demand savings typically decreases as the sample size increases, which tightens the confidence interval about the estimated average demand savings.

Sampling Methodology

The purpose of the pilot program is to assess customer behavior and estimate resulting peak kW and average kWh savings; therefore, the samples selected for each pilot program should theoretically be based on a distribution of kW and kWh savings. Because kW and kWh program savings from past or similar demand response projects are not available, average customer kWh consumption will be used as a proxy. Stratified random samples will be selected for each of the three programs as well as for the control group. A systematic sampling approach will be used to select the customers for each sample. This method is commonly used in the utility industry as it insures representation of a total population with respect to geographic location, peak demand, energy consumption, or other key elements.

Population Frame

The customer billing system provides the population frame from which sample customers will be selected for each of the three pilot projects and the control group. The population frame database contains three key files.

1. The "Total Population" file contains the key categorical data needed to perform the data analysis and select the customer samples, including name, address, state, telephone number, and the most recent 12 months of kWh consumption for all residential customers.

2. The "Qualified Population" file contains the 12 months of kWh consumption for residential customers. The source of the data for this file is the Total Population file. The consumption for each customer has been analyzed to identify customers with a pattern of year round consumption. From the year round population, any customer with

average summer kWh consumption less than 400 kWh will be eliminated as it's highly probable that consumption of 400 kWh or less is not reflective of air conditioning load.

3. Two individual "A/C Customer" files will be created:

    1. "A/C Customer – NH"
    2. "A/C Customer – MA"

    These files will contain all residential customers in the respective states with usage characteristics that reflect air conditioning systems. The files for NH customers may be further categorized by service territory if statistically significant differences between the territories are identified from the customer data.[9]

    The source data for these files will be the Qualified Customers file. The consumption patterns for each customer will be analyzed to identify those customers using air conditioning (A/C). A customer will be identified as an A/C customer if their average consumption during the months of June, July and August (peak months) exceeds the average consumption during April and October (shoulder months) by 30% or more. Those customers identified to be A/C users will remain in these files, while all others will be eliminated. Average annual energy consumption for the population of all residential A/C customers will be computed using this data.

Sample Design for Formal Pilot Implementation

As a means of minimizing the required sample sizes for each pilot program, stratified samples will be developed. Stratification will be based on average kWh consumption during the summer months. The purpose of stratifying for this study is to produce gains in precision of program savings by dividing the population of program participants into subpopulations, or strata, of smaller homogeneous groups. The variation in peak and energy savings estimates within each stratum will be less than the variation for the entire sample of program participants, allowing savings estimates to be developed at the desired level of precision with a small sample in each stratum. This process provides a means for minimizing the total sample requirement, thereby reducing project costs. Delenius and Hodges techniques will be used to determine the strata boundaries, and Neyman allocation techniques will be used to allocate the sample among the strata.[10]

[9] Development of the NH Customer files is beyond the scope of this submittal but will generally follow the methodology presented for the MA customers.

[10] William G. Cochran. Sampling Techniques, (John Wiley & Sons, New York, 3rd edition, 1977), pages 98-130.

The kWh strata of A/C customers and the required sample sizes are presented in table 3 below.

Table 3: A/C Customer kWh Strata

kWh Strata	Population	% of Population	Sample Size
401-600	1,129	24.3%	9
601-900	1,461	31.5%	18
901-1,200	990	21.4%	12
1,201-1,700	741	16.0%	14
1,701+	316	6.8%	23
	4,637	100%	76

Sample Selection

Four customer samples will be selected, one each for the three pilot programs and one for a control group. Each sample will include 76 customers. The breakdown of customers for each sample with respect to state is presented in Table 2 above and the breakdown of A/C customers by kWh strata is presented in Table 3 above. The sample customers will be recruited first from within the two "A/C Customer" files created in the population frame database, and then from within individual kWh strata. The files will be sorted in ascending order on annual average kWh consumption. Attempts will be made to recruit every n^{th} customer, where n equals the population of each strata divided by the desired sample size for each strata. This systematic sampling approach will ensure that the average kWh consumption for each sample is equal to the overall population. A sample population frame of 1,000 potentially eligible customers in Massachusetts and 1,500 potentially eligible customers in New Hampshire will be developed for ultimate recruitment.

Qualified customers who express interest in the programs will be recruited into one of the three programs until the quotas established in Table 2 are filled. The approach for marketing and participant recruitment is discussed later in this report. It is anticipated that the Massachusetts quota will be filled first and then the New Hampshire quota will be filled.

Control Group

The control group will be used as the baseline against which demand response actions of the pilot participants will be measured. The control group will be comprised of Unitil's existing residential load survey customers. The existing load survey customers are already provided with interval meters and have historical peak and usage data to serve as a reference. Additional control group samples will be recruited from within the "Qualified Population" file as necessary to fulfill the sample quotas.

The control group will include the same kWh strata distribution as represented in Table 3 above. The past twelve months usage data was reviewed for all load survey customers, and the average annual kWh was used to assign each customer into one of the kWh strata's. The ratio of peak month (June, July & August) average usage was compared to the shoulder month (April & October) average usage for each customer to assess whether the load survey customers meet the criteria for air conditioning users. Only load survey customers with a ratio of peak to shoulder month average usage of 130% or greater were included as "qualified" control group participants.

The number of qualified control group participants from the load survey customers is shown in the table below:

Table 4: Control Group Analysis of Load Survey Customers

kWh Strata	Required Sample Size	Desired Control Group Size		"Qualified" Load Survey Customers		Additional Recruitment Needed	
		MA	NH	MA	NH	MA	NH
401-600	9	3	6	7	8	0	0
601-900	18	6	12	7	16	0	0
901-1,200	12	4	8	14	12	0	0
1,201-1,700	14	4	10	5	11	0	0
1,701+	23	7	16	5	12	2	4
Total	76	24	52	38	59	2	4

The table above indicates that six (6) additional control group participants will need to be recruited from the Qualified Population file. To the greatest extent possible, control group participants will be selected to ensure a uniform distribution of average kWh usage within each stratum to minimize variation.

B.2.4 Marketing and Recruitment

Overview

The approach for marketing the pilot program to customers and for effectively recruiting participants is important to the success of the pilot. The marketing and recruitment process will include an initial mailer with a brochure describing the pilot program and inviting customers to participate. The tri-fold brochure will describe the program and provide methods for the customer to register such as a tear and return post card, on-line, or call in. A recruiting script will be administered to customers who register to determine whether they qualify for the program (i.e. A/C Customer) and to assess other pertinent demographic and behavioral information. If the required sample sizes are not achieved through the randomly selected sample of customers who self-register, a third party firm will be utilized to call the remaining customers who received the marketing materials but who did not register.

Background Research

After extensive research into other demand reduction programs, it was decided to name the pilot program. According to Peak Rewards™ (BGE Pilot Program Fact Sheet[11]) 72% of all respondents, which was 386 surveys out of 1,000 participants, ranked cost savings as the most important reason for choosing to participate with only 20% to conserve energy and improve the environment. Therefore, it was recommended to brand the pilot program Energy Savings Management (ESM).

[11] 2007 Pilot Fact Sheet, Peak Rewards, a BGE Smart Energy Savers Program, Demand Response Infrastructure (DRI) pilot program for Peak Rewards

Additional market research was conducted to determine whether incentives are necessary to recruit customers into the program. For every white paper and statistical research in favor of offering a financial incentive, there are others against it. Additionally, if incentives are offered, there are no resources to determine what is the correct amount? For this pilot, some forms of incentives are contemplated. The incentives will be in the form of initial sign up incentives, incentives for completing the program, or as rebates offered to customers who incur significantly higher than average utility bills due to an incomplete understanding of the rate structure. The need for, and ultimate amount of incentives offered will be determined based on results of the marketing study. Customer interest in each of the three programs will be assessed first on its own merits, and then if a participation incentive was offered. If customer interest is sufficient with no additional incentives, none will be offered.

Marketing Study

A limited marketing study will be conducted prior to the recruitment effort for formal pilot implementation participants, to help inform final pilot design and implementation protocols. This study will consist mainly of secondary data collection and review and a small primary data collection (phone survey) effort with input and assistance provided by RKM Research and Communications (of Portsmouth, NH). A total of 75 phone surveys will be targeted to a random selection of Massachusetts customers who have been identified as potential A/C users. The phone surveys will gather information on whether the customers do in fact have A/C and will gauge general interest in the programs. The surveys will also be used to assess the need for monetary incentives to encourage program participation. The TOU rate structure will be discussed with the customers and reactions will be gauged. The results of the marketing survey will help determine whether the rate structures should be modified to encourage participation. Topics and sample questions that will be addressed during the survey are included in Appendix B, Attachment 1.

Initial Mailer

The first phase of the marketing and recruitment effort will be to send out a direct mailer to the randomly selected sample groups in the MA and NH service territories. The mailer will be sent out separately from the bills; bill stuffers will not be used. The mailer will include a 4-color tri-fold brochure that will describe the program and highlight benefits to the customer, the utility, and the environment. To keep with the integrity of the Unitil brand the ESM logo will be very simple – there will not be a graphic element to keep in line with Unitil's brand standards. The brochures will identify three options for interested customers to register for the program; by visiting a link off the Unitil website, by phone, or by tearing off and returning a perforated portion of the brochure. Each sign-up option will include key marketing questions that will help to better qualify customers for the program. A sample brochure for the Simple TOU program is included in Appendix B, Attachment 2.

Incentives may be offered for initial registration or for completing the pilot program. The need for financial incentives and the monetary value of such incentives will be determined based on results of the initial marketing telephone surveys.

Recruitment Script

A recruitment script will be used to qualify interested customers for the programs and to assess relevant demographic and household information. Gathering household information such as the

size and age of the property, the number of people living in the residence, properties of space conditioning and water heating systems can help normalize pilot results. The primary qualifying characteristic for participation is the presence of an air conditioning system. Customer specific information will be collected so that conclusions on demand response actions and customer satisfaction may be drawn between different demographic categories.

The recruitment phase will also be used to determine the primary motivations customers have for participating in the program. Assessing customer motivations at this stage will assist the marketing effort for a full rollout of the program if it is successful. Customers will be asked whether they have taken any significant actions to improve energy efficiency in their homes in the past two years. This information will be useful in determining whether results are potentially skewed by early adopter bias, and whether or not much of the "low hanging fruit" efficiency measures have already been incorporated. A list of topics to be addressed during the recruitment phase is included in Appendix B, Attachment 1.

Pilot program participants will be first recruited from within the group of randomly selected customers who responded to the initial mailer either on-line, on the phone, or via the registration card. If the program quotas are not filled from within this group, customers who did not respond to the initial mailer will be directly targeted for recruitment via telephone.

B.2.5 Educational Materials

Once the target number of customers has been enrolled into each of the three programs, they will be sent educational materials relevant to the program in which they are enrolled. The materials will include a letter from Unitil describing the pilot program, briefly outlining the benefits to both the customer and to Unitil. A sample letter that will be sent to customers being recruited for the Simple TOU program is included in Appendix C, Attachment 1 for reference. The education materials will be presented in a special folder that will contain handouts illustrating examples of how customers can manage electricity usage to benefit from the programs. An outline of the educational materials for the Simple TOU program is included in Appendix C, Attachment 2 for reference.

A focus of the educational materials for the Simple TOU and the Enhanced Technology Program participants is to develop the concept of a time-of-use rate schedule so that the customers understand they are paying a premium price for on-peak electricity but are getting a heavily discounted price for off-peak usage. The educational materials will expand on this concept by identifying the best ways to minimize on-peak electric usage. Specific examples of load shifting will be provided, along with simple calculations showing the cost savings associated with off-peak usage. Coupling a thorough understanding of the time-of-use rate schedule with the tools and knowledge to effectively manage electricity usage is intended to incent customers to wisely manage their consumption.

Educational materials for all the programs will include material on incorporating general energy efficiency practices in homes to reduce overall consumption. Examples of energy efficiency practices include turning off lights when rooms are not occupied, replacing incandescent bulbs with compact fluorescents, turning down the set point of electric water heaters and so on. The educational materials are based in large part on information presented by the U.S. Department of

Energy (DOE) and include references to the DOE and *ENERGY STAR*® websites for more detailed information on energy efficiency practices and products.

An important aspect of the educational materials is to identify the benefit of demand response to the utility. The educational materials highlight the enhanced cost and increased greenhouse gas emissions associated with peak generation. Demand response is a means to increased reliability of the distribution system and to potentially lower costs for all customers by limiting the cost paid by the utility for peak generators.

The educational materials will also develop the concept of critical peak periods. The frequency and typical duration of critical peak periods are discussed in Section B.3. The educational materials will focus on a higher level view of the benefits and savings opportunities of Demand Reduction and the impact of CPP on end users and utility wide costs and emissions. The educational materials will explain time of use rates at a higher level and will then focus on the impacts of participating in demand reduction. The educational materials will also outline the impacts of not participating and the potential cost impacts.

Customers in the enhanced technology and smart thermostat programs will be provided with information specific to the equipment they are provided with. Participants of both the enhanced technology and smart thermostat programs will receive thermostats that visually indicate whether it is a period of on-peak, off-peak, or critical peak so that the customers can respond accordingly. The visual indicators will be summarized in the educational materials and will be covered by contractors at the time of equipment installation. Participants in the enhanced technology program will be provided with literature on the Tendril package when the equipment is installed.

B.2.6 Customer Management

Specific procedures will be developed to handle customer interactions pertaining to the pilot programs. Program participant accounts will be specifically identified as being part of a time of use pilot program and all relevant billing and usage information will be available. Customer service representatives will be prepared to deal with anticipated issues such as higher than normal bills, problems with the enabling technology provided, customers moving out of area, and customers wishing to un-enroll in the program. Customer service representatives that will interact with pilot participants may undergo a brief training session to review the details of the program and important differences between the three programs.

For high-bill complaints, customer service representatives will be capable of retrieving billing records and evaluating the usage during each time of use period with the customer. The service representative will attempt to determine why the bills are higher than normal, likely due to excessive on-peak usage, and discuss means and methods for shifting load to off-peak hours to save money. The customer service representative may review the online educational materials with the customer.

If customers are unhappy with the program and wish to be un-enrolled, there will be a procedure for returning the customer to a flat rate. The procedure first involves identifying the reason why the customer is unhappy with the program and attempting to work through the problem with the customer. If the customer insists on dropping out of the program, they will be returned to a flat

rate and a post-pilot survey will be administered. The survey will be used to assess the customer's experience throughout the program and to concretely identify the reason why they are dropping out. Customers will be asked to comment on ways to improve the program in the future.

B.2.7 Measurement and Verification

The successful measurement and verification of load reduction and energy usage savings achieved is a key objective of the pilot. To quantitatively measure the per participant load reduction during on-peak and critical peak periods, interval recorder electric meters will be installed for each customer participating in the pilot and the control group customers. The interval meters will collect peak and usage data in fifteen (15) minute intervals.

Unitil plans to incorporate AMI endpoint technology at each interval meter for billing purposes. AMI meters are currently installed throughout Unitil's Massachusetts and UES' New Hampshire service territories and it is desirable to test the billing capabilities of the AMI system with a time of use rate structure. The AMI endpoints are capable of reporting up to four separate registers for kWh usage in a single day. For the pilot, two AMI registers will be used; 1pm to 6pm and 6pm to 1pm the following day. These registers will be capable of reporting usage during on-peak, off-peak, and critical peak periods for pilot program participants. The daily reporting capability of AMI will be utilized to capture usage during a CPP event.

Demand reduction during CPP events will be assessed by comparing interval load data during a CPP event to the same time period on a non-CPP day with similar weather conditions as well as immediate load changes observed. The outdoor air temperature, RH, solar heat gain coefficient and wind will be taken into consideration for the Non CPP and CPP afternoons. Demand response of the pilot participants will also be measured against the control group during the CPP period. The length of demand response actions during CPP periods will also be assessed to determine whether there are significant changes as length of the CPP event increases.

The impact of the time-of-use rates and enabling technologies will be calculated by comparing interval data from the pilot program participants to the interval data from the control group, and also with similar periods from the previous year (2009). Objectives of the pilot include quantitatively measuring the following:

- Overall usage (kWh reduction)
- Demand response (kW reduction) during on-peak periods
- Demand response (kW reduction) during critical-peak periods
- Electric usage (kWh reduction) during on-peak periods
- Electric usage (kWh reduction) during critical-peak periods
- Price elasticity (customer response to different price points)

In addition to the quantitative measurement of interval data as discussed above, participant surveys will be conducted at the onset and at the completion of the pilot project. The surveys will be used to assess customer reaction to the programs, customer behavior, and feedback for

improving the program for full program roll out. Anticipated survey topics are presented in Appendix B, Attachment 1.

Program Evaluation
The success of the pilot program will be judged based on performance in the following key categories:

1) **Customer Experience**: A successful pilot program will result in an overall positive customer experience. Customer satisfaction will be assessed using the post-pilot surveys.

2) **Low Dropout Rate**: Some customer complaints are expected as would be with any new program with a new form of billing. The means with which customer service representatives can mitigate customer complaints and keep participants enrolled is important to the success of the program. A goal of the program is to limit dropouts to not more than 10% of any sample population.

3) **On-time and Accurate Billing**: This pilot program will test the TOU capabilities of Unitil's existing AMI "smart" metering systems. One of the goals of the program is to ensure timely and accurate billing to all participants.

4) **Achieve Measureable Demand and Usage Savings**: The pilot program is designed to achieve demand and usage savings of at least 5%. A goal of this program is to exceed those minimum thresholds as well as collect statistically valid price elasticity information.

5) **Program Cost Effectiveness**: Administering and managing the pilot project on-schedule and on-budget is a goal of the program. The pilot program is also designed in such a way to evaluate the most cost effective method to achieve demand reduction at peak times. The pilot is expected to develop a price elastically model to show at what point participants react or don't react.

B.2.8 Implementation

The implementation involves the upgrading of all participant meters and enabling technology for the program participants. The installation phase will be initiated with a RFP that will outline a concise scope of work and will solicit competitive bids to install the meters and enabling technology equipment. It is anticipated, but not necessary, that the upgrade of meters will be conducted separately from the enabling technologies. The RFP will require the contractors to install and test the meters and technologies to ensure functionality at the onset of the pilot.

Product installation will include customer education where the contractor will review the operation of the equipment with the customer and answer any questions they may have. For the programmable thermostats, the contractors will assist in setting up a weekly schedule with input from the customer if so desired. The on-peak and-off peak period will be specifically explained to pilot participants. The Tendril packages will be installed by technicians specially trained in using the systems who will be able to guide the customer through the program and answer any questions they may have.

B.3 Pricing

This section describes the methodology the Company used in determining the summer months that the TOU/CPP Pilot Program would be in place, the hours to be used for the on-peak and critical peak periods as well as the relative pricing of default service during the period when the Pilot Program would be in place. A pricing section has been developed to provide the Department with estimates of Default Service ("DS") pricing ratios for the different rate periods. As noted earlier, the results of the marketing survey will help determine whether the rate structures should be modified to encourage participation.

B.3.1 Term of the Pilot Program and Pricing Periods

Recognizing the goal of reducing summer peak demand, the Company anticipates that the Pilot Program would be run for 3 months, June through August, since these are the months in which an annual peak is most likely to occur. The Company analyzed whether or not it was likely that a summer peak would occur outside this 3 month period. It reviewed the last three years of Unitil system load data from May 1 to September 30 of the years 2006 to 2008 to determine the likelihood that a system load in May or September exceeded 90% of the summer peak load in each year. See Appendix D, Attachment 1. This confirmed the Pilot Program term of June 1 to August 31. June 1 is also the effective date of the mid-year DS rates change.

The next step in the process was to determine the appropriate time periods to use for the on-peak rates and critical peak period rates. The Company reviewed its system load data during the summer of 2008 in order to determine appropriate hours for the on-peak period. The on-peak period would not include weekend days or holidays occurring during a weekday. During the period June 1 to August 31, the only holiday would be Independence Day. The top 75 hours of system load data were reviewed and the individual hours in which the loads occurred were counted. The majority (43 of the 75) of the highest system loads occurred in the period between hours ending 14:00 and 18:00. Therefore the Company decided the on-peak period would be from 1:00 PM to 6:00 PM on non-holiday weekdays. See Appendix D, Attachment 2. The use of a five hour window for the peak period allows customers ample load switching opportunity and it is hoped this will increase customer participation in the Pilot Program.

The Company then reviewed whether the critical peak periods, when called for, should be the same hours as the on-peak period. The Company's AMI system must be configured in advance of when the critical peak periods occur for the appropriate time periods to collect consumption data. The lead time to reprogram the meter endpoint for a critical peak period may be up to a few days. Since the Company may not know it is likely to request a critical peak period that far in advance, it was decided that the critical peak period hours would be the same as the on-peak hours, from 1:00 PM to 6:00 PM during non-holiday weekdays. When a critical peak period day is declared, the Company would program its command center to recognize the data collected during the on-peak hours of that day as critical peak period consumption. If the data was not collected from an endpoint in the evening following the critical peak event due to technical

reasons, the Company would either calculate the consumption based on interval data, if available, for the customer or would forgive the critical peak pricing for that customer for that event. In other words, the missing consumption data for the period would be considered on-peak period consumption rather than critical peak period consumption if the data was not available. Thereby the customer is not penalized if the Company has not collected the critical peak period consumption data. The Company will not call a critical peak period more than 8 times during the term of the Pilot Program. This will help in the enrolling of customers since they know there will be a predefined limit to the number of called critical peak periods.

All Customers participating in the Pilot will be metered with an interval data recorder which will collect interval data in 15 minute intervals. This data will be used in the analysis of the amount of load shifted from the peak period and during a critical peak event. Unless required, the interval data will not be used for billing customers. One of the lessons to be learned from the Pilot Program will be about the functionality of the Company's AMI system in collecting time-of-use and critical peak period load data and transfer that data to the billing system. These will be necessary components of any type of full scale time-of-use program that might possibly be implemented in the future.

B.3.2 Default Service pricing ratios for each time-of-use period

The Pilot Program pricing for each time-of-use period will be based on the Fixed DS prices in effect for the period June - November of the year in which the pilot program is effective. It is currently expected that this will be 2010. The vast majority of residential customers are on the Fixed DS rate. This rate is level for the six month period that rates are in effect and does not vary from month to month like the Variable DS rate. At the conclusion of the Pilot Program, customers will return to whichever DS rate they were on prior to the start of the program, Fixed or Variable.

First, the Company reviewed the locational marginal price data for the Western Central Massachusetts Load Zone of ISO-New England for the period June 1 – August 31, 2008 in order to attempt to develop cost based prices for each time-of-use period. The average price was $96.45 per MWh during the period. In order to compute a more reflective price of that which was incurred by residential customers in Unitil's service territory, the residential class average load profile data in each hour was multiplied by the price in each hour and a load weighted average price was determined to be $0.10229 per kWh. This result appears logical, since residential customers will typically use more energy during the daytime and evening when prices are higher and will use less energy during the nighttime period when prices are lower.

In order to attempt to determine pricing for the critical peak period, the Company sorted the data by price from highest to lowest and determined the top twelve days in which the highest prices occurred, regardless of hour in which they occurred. Four of these days occurred on a weekend and were removed from the analysis since the Company will not call a critical peak period on a weekend. For the other 8 days, the Company computed the load weighted average LMP prices from 1:00 PM to 6PM. The load weighted average critical peak period price was $0.21169 per kWh, only 107% higher than the average price. This compares with the average on-peak period

price of $0.13250 per kWh (only 30% higher than average) and the average off-peak period price of $0.09691 per kWh (only 5% lower than average). Because the percentage differences between the average price and the on-peak period and the critical peak period prices were so small, the Company decided that these percentage variances, if applied to the DS prices for the pilot program, would most likely not result in significant enough shifting by customers of load from the on-peak and critical peak periods to the off-peak period or overall reduction of load.

Based on this conclusion the Company then chose to evaluate different time-of-use price levels based on various ratios to an average DS price of $0.12000 per kWh. This estimate was used because the current residential fixed DS price is $0.11787 per kWh. This estimate is used to evaluate different pricing scenarios in order to develop actual pricing ratios to be used in the implementation of the Pilot Program for each time-of-use period. The Company reviewed different price ratios based on two assumptions: 1) a pricing multiplier for on-peak and CPP versus the calculated off-peak DS price and 2) a pricing multiplier for on-peak and CPP versus the Fixed DS price. See Appendix D, Attachment 3.

Page 1 shows the results of the pricing multiplier versus the calculated off-peak price. The off-peak period price has a pricing multiplier of 1 in all the scenarios since it used as the basis of the multiplier. On-peak pricing multipliers of 2 and 3 are reviewed and critical-peak pricing multipliers of 5 and 8 are reviewed. The rates are developed to be revenue neutral based on class average residential load profiles allocated to each time period in the summer of 2008. For example, at the top of page 1, the on-peak price is set at 2 times the off-peak price and the critical peak price is set at 5 times the off-peak price. The off-peak price is calculated based on these criteria so that the total revenue averages $0.12000 per kWh. In this example, the following prices result: off-peak kWh: $0.09809; on-peak kWh: $0.19618; CPP kWh: $0.49045. The resulting ratios to the Fixed DS price would be off-peak kWh: -18.3%; on-peak kWh: +63.5%; CPP kWh: +308.7%. This exercise is repeated for each scenario on page 1.

Page 2 shows similar examples, but with a slight variation. The pricing multiplier used is versus the Fixed DS price, rather than the calculated off-peak price. In the first example at the top of page 2, the on-peak price is set at $0.24000 per kWh (2 times the DS price) and the CPP price is set at $0.60000 per kWh (5 times the DS price). The off-peak kWh price is then determined for revenue neutrality and is determined to be $0.08842 per kWh. The Company reviewed the different scenarios and chose the bottom scenario on page 2 which uses a pricing multiplier of 3 for the on-peak period and 8 for CPP. This scenario produces the lowest off-peak kWh price ($0.06024 per kWh in the example) which accounts for about 85% of customer load and hours. The Company determined a low off-peak price would incent customers to not only want to participate in the Pilot Program but to also shift load from the on-peak period. In addition, the Company felt that the higher on-peak period and CPP prices would help it meet its goals of 5% energy and peak demand reduction for the participants. In the example, the on-peak price would be $0.36000 per kWh and the CPP price would be $0.96000 per kWh. These are 3 times (200%) and 8 times (700%) higher than the Fixed DS price, respectively. The ratio to be applied for the off-peak period price would be -49.8%, resulting in a rate of $0.06024 in the example. These are the ratios that will be applied to the actual DS prices in effect on June 1, 2010 when the pilot program is implemented.

If the actual DS price in June, 2010 has declined to $0.10000 per kWh for example, the on-peak price would $0.30000 per kWh and the CPP price would be $0.80000 per kWh. The off-peak price will be calculated based on the kWh in each time period to produce a revenue neutral rate, assuming no shifting, and would be $0.05020 in this example. To the extent customers shift or reduce load, it will create an opportunity for them to reduce their bills and pay a lower price per kWh for DS. For example, with the rates calculated in the paragraph above, a customer who is able to shift 100 kWh in one month from the on-peak period to the off-peak period would save almost $30 on their monthly bill (100 x ($0.36000-$0.06024)).

B.4 Sample Tariffs

A sample tariff for the Pilot Program is included in Appendix E, Attachment 1. Rates are not shown since they will be determined at a future date based on the Default Service rates determined for June 1, 2010 and the pricing multipliers developed in this filing. Since the Pilot Program is a temporary three month program, the Company proposes to show the Pilot Program DS rates in this schedule rather than its complete summary of rates, currently M.D.P.U. 174.

A sample redlined tariff for Default Service is also included. As discussed in Section III, Cost Recovery, these costs will be collected through the Default Service Costs Adder mechanism, which is included in the Default Service rate for billing purposes. Paragraph F. is added to the tariff to reflect the addition of these costs for recovery.

Both tariffs are filed for "information purposes only" at this time and are therefore unnumbered. When the Pilot Program concept has been approved and Fixed Default Service rates for June 1 of the year in which the Pilot Program will be implemented are known, the Pilot Program tariff will be re-filed. The revisions to the DS tariff will most likely be filed at the same time.

B.5 Billing Presentation

For bill presentation of the rates, the DS prices and kWh consumed as shown on customer bills will be itemized into off-peak, on-peak, and critical peak periods. Since the pilot program runs for three calendar months and customers are billed on a billing cycle basis, Customers will receive a bill with blended (pro-rated) pricing in the first month of the program and the first month after the program has ended.

III. Cost Recovery

The Company proposes that incremental costs incurred in the providing of the Pilot Programs be recovered through the Default Service ("DS") Costs Adder, included in the DS Charge, so that it may be appropriately recovered only from the Company's DS Customers. The total costs are estimated at $214,424 as shown in Appendix A, Costs Summary. These costs would be included in the Company's DS Cost Adjustment model filed on or about September 1 of each year, for recovery over the period of one year beginning in December 2010. This methodology is in Compliance with section 85 of the Green Communities Act. Although the DS rates are designed to be revenue neutral, the Company expects there will be some under/over-recovery of DS costs which the Company proposes to reconcile through DS. This reconciliation will be automatic in that the DS Pilot revenues and costs will be included in the DS reconciliation.

Due to the limited nature of the Pilot Programs, the Company is not seeking recovery of lost distribution revenue due to associated demand and energy reductions.

Based on the estimated costs above, rate impacts are estimated to be approximately $0.00084 per kWh if recovered in one year using an estimated 256,741 MWh for the recovery year. This represents an impact of $0.42, or about 0.4%, on the typical 500 kWh customer's monthly bill assuming current rates.

Unitil

Appendix A

Estimated Incremental Implementation and Administration Costs for Smart Grid Pilot Projects

		Hours and Cost	FG&E Allocation	UES Allocation	Notes:
	Power Quality Monitoring with AMI				
1	Internal Labor Resources only	$ -			
	Capacitor Control with AMI				
2	Estimated equipment costs	$ 10,000			
3	Internal Labor Resources only	$ -			
4	Total AMI Pilot Projects	$ 10,000	$ 10,000		FGE only
	TOU/CPP/Demand Response Pilot Project Installation and Materials Costs				
5	Cost of Analysis Meters installed	$ 500			
6	Estimated quantity installed	235			
7	Total Cost of Analysis Meters installed	$ 117,500			
8	Cost of Tendril Package installed	$ 1,000			
9	Estimated quantity installed	76			
10	Total Cost of Tendril Packages installed	$ 76,000			
11	Cost of Thermostats installed	$ 650			
12	Estimated quantity installed	76			
13	Total Cost of Thermostats installed	$ 49,400			
14	Marketing and Educational Materials	$ 12,000			
15	**Total Installation and Material Costs**	**$ 254,900**	**$ 81,568**	**$ 173,332**	32%/68%
	Project Consulting				
16	Estimated Cost for Project Plan Support	$ 60,000			
17	Estimated Cost for Regulatory Support	$ 36,000			
18	Estimated Cost for Bid and Installation Oversight	$ 9,000			
19	Estimated Cost for Customer Service training	$ 3,600			
20	Estimated Cost for Data Management and Analysis	$ 12,000			
21	Estimated Cost for Administer post-pilot surveys	$ 9,000			
22	Estimated Cost for Report and Recommendations	$ 18,000			
23	**Total Program Management Costs**	**$ 147,600**	**$ 73,800**	**$ 73,800**	50%/50%
	Participation and Incentive Costs				
24	Estimated participants	228			
25	Estimated cost per participant	75			
26	**Total Participation and Incentive Costs**	**$ 17,100**	**$ 5,472**	**$ 11,628**	32%/68%
	Meter Interface and Feeds Into the Billing System (Plan, Design, Modify, Interface and Test)				
27	Cost of Labor per Hour for Contract Programmer	$ 100			
28	Estimated Range of Time Required	200			
29	**Total Meter Interface**	**$ 20,000**	**$ 10,000**	**$ 10,000**	50%/50%
	CIS Billing System (Plan, Design, Interface, Modify, Bill Print, Test)				
30	Cost of Labor per Hour for Contract Programmer	$ 200			
31	Estimated Range of Time Required	100			
32	**Total for CIS Programming**	**$ 20,000**	**$ 10,000**	**$ 10,000**	50%/50%
	Internal Revenue Reporting (Plan, Design, Interface, Modify, Test, Document)				
33	Internal Labor Resources only	$ -			
	Customer Data Management/Internal and External Web (Plan, Design, Test)				
34	Cost of Labor per Hour for Contract Programmer	$ 100			
35	Estimated Range of Time Required	100			
36	**Total for Customer Data Management**	**$ 10,000**	**$ 5,000**	**$ 5,000**	50%/50%
	Administration Costs (Customer Relationship and Rate Management)				
37	Internal Labor Resources only	$ -			
38	**Contingency (10%)**	**$ 46,960**	**$ 18,584**	**$ 28,376**	
39	Total TOU/CPP/Demand Response Pilot Costs	$ 516,560	$ 204,424	$ 312,136	
40	Grand Total Pilot Projects	$ 526,560	$ 214,424	$ 312,136	

Marketing Phone Survey Topics and Sample Questions

This section presents the topics and some sample questions that will be covered in the marketing surveys. The marketing surveys will be targeted to 75 Massachusetts customers with air conditioning systems and is intended to inform the final development of the pilot program.

Topic: Air Conditioning System

1) Do you have a central air conditioning system?
2) What is the approximate age of the system?
3) Do you have a programmable thermostat?
4) Do you use the Programmable thermostat?

Topic: Demographics

5) Age bracket – Age of the head of house hold.
6) Household income bracket – Estimated annual combined income.

Topic: Home Characteristics

7) Is the home seasonal or permanent?
8) Do you own or rent the property?
9) Do you pay your electric bill or does someone else?
10) What is the approximate square footage of the home?
11) How many floors is the home?
12) Is the basement heated and or cooled?
13) Do you have high speed internet access?

Topic: Customer Behavior

14) Do you set back at nights (winter) and during unoccupied times (summer)?
    a. Via set thermostat or manually?
    b. To what temperature in the summer?
15) Is anyone in the household home during a typical day?
16) Do you manage your electric bills online?
17) Do you have a business in the home?
18) Do you know what demand response is?

Topic: Customer Interest

Goals:

- *Assess interest in programs, willingness to change behavior to save money*
- *Gather information on price impacts, including willingness to participate at the various program levels*

- *Assess whether incentives are required to recruit customers, and the magnitude of such incentives*
- *Assess initial customer perception of programs (i.e. likes, don't likes, etc.)*
- *Assess reaction to the number and duration of CPP events*

Sample Questions

19) How interested would you be in participating in a program that allowed you to reduce your monthly electric bills?

20) Rate your interest if the savings was dependant on shifting some of your electric usage to off peak periods (6pm at night-1pm the following afternoon)

21) How willing would you be to raise the set point of your thermostat between 1-6pm on a hot summer day if the cost of electricity on that day was twice as high as the normal rate? Four times? (Craft question to assess price point response) From both the monthly bill stand point and signup/participation perspective.

22) How interested would you be in receiving a free in-home electronic energy management system with wireless control that allows you to monitor electric usage in real time?

23) How interested would you be in receiving a free (installed) programmable thermostat if the set point could be raised by the utility for up to four hours between 1-6pm on a hot summer day? 5pm?

   a. What if the utility could raise the set point on a hot summer day, but you could override the setting at the thermostat?

Briefly describe the simple, enhanced, and smart thermostat programs:

24) Would you participate in one these programs?

   a. Rank level of interest?
   b. Is level of interest affected if monetary incentives or utility rebates are offered?

Encourage open dialogue to obtain customer reaction to these programs.

Recruiting Script Topics

- Do the customers have central air conditioning?
- Do the customers have a programmable thermostat?
    - Do they set back temperature at night and during the day?
- Rate motivations for participating on a 1-5 scale:
    - Lower utility bill
    - Reducing greenhouse gas emissions
- Age and Income Bracket
- Number of people in household
- Do they plan to undertake any load shifting measures?
    - What actions?
- Have they recently undertaken any measures to become more energy efficient?
- Preferred method of communication for a critical peak event (Phone, page, email)

Post-Pilot Survey Topics

- What actions did customers take to reduce usage, or shift load to off-peak hours?
  - Did they raise thermostat set points? If so, by how much?
- Did customers respond differently to on-peak events compared to critical peak periods?
- Rate customer satisfaction on a scale of 1-10
  - What could be done to improve the customer experience?
- For the enabling technology segments:
  - Rate the technology on a scale of 1-10
  - What could be done to improve the technology / customer experience
- Would they participate in a similar program if it were offered year round through Unitil?
  - Why or why not?

SIMPLE TIPS ON HOW TO CONSERVE ENERGY

- Plug home electronics into a power strip and turn off the power strip when not in use – this reduces "phantom" loads
- Minimize any electrical use during on-peak periods (washers, dryers, dehumidifiers, etc.)
- Replace incandescent light bulbs with CFLs
- Replace outdoor lighting with CFLs, LEDs or solar powered fixtures
- If replacing water heaters or appliances use ***EnergyStar*** brands
- Air dry dishes instead of using the drying cycle
- Wash only full loads of dishes or clothes
- Take showers instead of baths
- Unplug second refrigerators or freezers if they are not necessary
- Turn off CPU and monitor when not in use
- Insulate hot water pipes

For a complete list of tips visit www.unitil.com/esmtips

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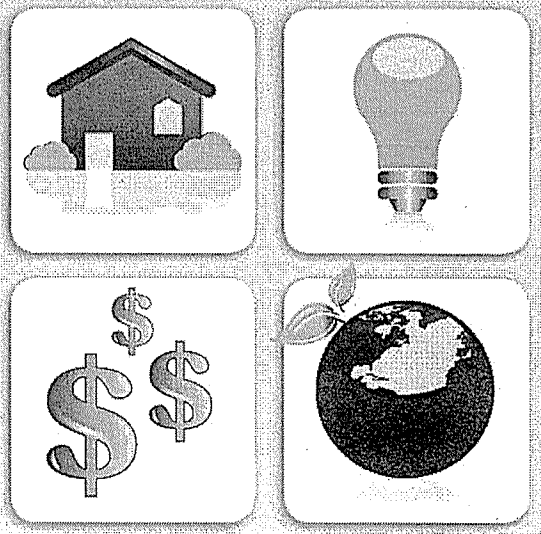


ENERGY$AVINGS MANAGEMENT

For more information

UNITIL CORPORATION
6 Liberty Lane West
Hampton, NH 03842-1720
1-888-8-UNITIL • www.unitil.com

An initiative powered by:

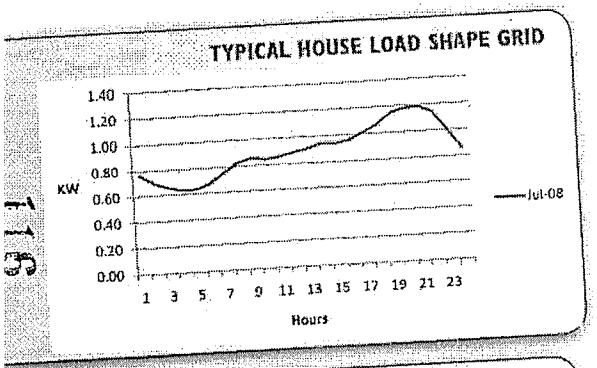
Unitil
We deliver.
It's that simple.

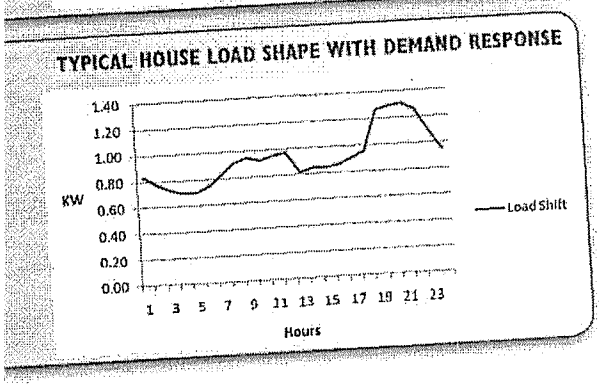
At Unitil, we are always in search of programs and products that offer consumer cost-savings and environmentally-friendly programs. *Energy Savings Management* offers you the ability to manage your energy usage and save money all while protecting the load or energy demand on the environment. You have been selected as a potential consumer that would benefit from this program and potentially reduce electrical needs from this program and therefore your electricity bill.

What is Energy Savings Management?

Energy Savings Management is a pilot program developed by Unitil to save you money on your electricity bill. If this pilot is as successful as we hope this may be added to Unitil's product offering.

You, the residential customer, have the power to reduce your energy usage during periods of peak demand. When you reduce usage during peak demand, you conserve natural resources such as coal and natural gas used to produce electricity and prevent harmful greenhouse gases from entering the atmosphere.





What is Peak Demand?

Peak demand is a period during which there is a significantly higher than average usage (demand) of electricity. These occur most frequently in the summer months when homeowners and businesses are running air conditioning. In some cases, the demand is near what the utility is capable of supplying, resulting in potential power instability. Utility companies pay a premium price to purchase power to meet peak demands and pass this cost on to consumers in the form of higher fixed rates.

What is Demand Response?

For the purpose of this pilot program, "demand response" refers to curtailing residential electric usage during times of extreme demand. Even small reductions in residential peak demand, taken cumulatively across the larger number of households, can have a profound effect of reducing costs and greenhouse gas emissions. By not having to purchase "peak" electricity at a premium price the savings could be passed on in the form of lower rates.

What's the Next Step?

Register for this pilot program by simply filling out the form or online at www.unitil.com/esmregister. You will receive a packet of education materials complete with how to instruction and tips on how to conserve energy and SAVE money while protecting the environment.

Yes, sign me up to participate in Unitil's *Energy Savings Management* program today!

ENERGY$AVINGS MANAGEMENT

Schedule JCE-1

Page 37 Of 56

Name

Name on Unitil Account if different than above

Street Address

City, State, Zip

Daytime Phone #

Evening Phone #

Cell Phone #

Email Address

Unitil Account #

Please contact me:

- ☐ By Phone
  - O *Daytime* O *Evening* O *Anytime on Cell*
- ☐ By Email
- ☐ By Mail

Signature: By signing this document you agree to participate in the pilot program for Unitil's Energy Savings Management. I authorize, Unitil and their energy partner, GDS & Associates to use share my account information for the purpose of this program and not for any other purpose.

Signature

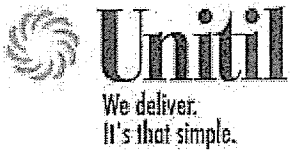
Date

Please detach panel and mail to:

Unitil
c/o GDS & Associates
1181 Elm Street
Manchester, NH 03101

Or sign up online at www.unitil.com/esmregister

Appendix C
Attachment 1



April 2010

Dear Unitil Customer,

At Unitil we are always looking for innovative ways to become more energy efficient and to offer consumer cost savings initiatives. In this time of earth conscience consumerism we are offering a new program to customers in your area. The Energy Management Savings pilot program is a cutting edge technology based product that will not only save you money but support the environment as well.

This pilot program includes different products and concepts that are intended to reduce electricity consumption during periods of peak demand when both the cost and demand of energy is at its highest. By reducing the electrical use in peak times when we have to pay a premium for electricity we will be able to pass that savings onto you the consumer.

I am eager to analyze the results of this program. I feel that energy efficiency, cost savings and simple but effective changes to electrical usage are the key to our energy future. All of these actions can significantly reduce the amount of greenhouse gases that are emitted to our atmosphere. Anything we can do to protect our environment for future generations is everyone's responsibility – especially ours. As an added incentive to participate in these energy savings initiatives I am pleased to offer you a $75 credit voucher toward your electricity bill upon completion of this project. I encourage you to review the enclosed educational materials and visit our website for an exciting new suite of tools designed to help you understand and manage your utility bills!

Sincerely,

Program Coordinator

APPENDIX C
Energy Savings Management (ESM) Educational Component – Simple Product

Front Cover:

- similar/same look and feel as recruitment brochure:
- Four elements….a house (residential), light bulb (energy), dollar sign (savings) and maybe something to signify "green" or earth. (I envision it like one big square with four squares within each one color)
- Energy Savings Management logo
- *An initiative powered by:*

Unitil
We deliver.
It's that simple.

Back Cover:

- Unitil Logo

For more information Unitil Corporation
6 Liberty Lane West / Hampton, NH 03842-1720 / 1-888-8-UNITIL
www.unitil.com

This was printed on recycled material.

APPENDIX C
Energy Savings Management (ESM) Educational Component – Simple Product

Inserts:

- 4 color process over 0/ size varies – stacked inserts

Insert #1: About *Simple TOU* Product

Thank you for participating in Unitil's Energy Management Savings pilot program. This pilot program is designed to investigate the costs and benefits associated with demand reduction programs. This pilot program will investigate time-of-use (TOU) rates incorporating on-peak and off-peak rates with a critical peak price (CPP) that can be initiated during periods of extreme electricity demand. You have been selected to participate in the *Simple TOU Program.* Therefore you are set up on a time-of-use rate structure and you will be notified of a CPP event via email, page, Web posting, or phone call, based on what you selected during recruitment.

The educational materials in this packet contain the tools and information you will need to reduce your energy costs. The packet includes helpful information to become more energy efficient as well as "load shifting measures" like washing clothes or dishes outside of the "peak demand" timeframe (1 pm to 6 pm) you can reduce "energy demand." By reducing usage during periods of peak demand, you conserve natural resources such as coal and natural gas used to produce electricity and prevent harmful greenhouse gases entering the atmosphere.

With the information in this packet you should have everything you need to make your home more energy efficient. This and additional information can be found on the web at www.unitil.com/DRpilot

Insert #2: *Peak Demand*

What is peak demand and what is the relevance?

- Peak demand is a period during which there is a significantly higher than average usage/demand of electricity (typically during a heat wave).
- In some cases, the demand for electricity is near what the peak generation a utility is capable of supplying, resulting in potential power instability.
- Periods of peak demand occur most frequently in the summer months when homeowners and businesses are running air conditioning systems to keep cool.
- Special electric generation stations, called "peakers", are used to generate the additional electricity needed to meet peak demand. Peakers are generally among the least efficient electric generators and emit higher than average amounts of greenhouse gases.

APPENDIX C
Energy Savings Management (ESM) Educational Component – Simple Product

- Utility companies pay a premium price to purchase power to meet peak demands and pass this cost off to consumers in the form of higher fixed rates.

Insert #3: *Demand Response*

What is demand response and what is the benefit?

- Need charts/graphs
- For the purpose of this pilot program, "demand response" refers to curtailing residential electric usage during times of extreme demand (1-6pm, weekdays, in summer months).
- Even small reductions in residential peak demand, taken cumulatively across the larger number of households, can have a pronounced effect on reducing costs and reducing greenhouse gas emissions.
    - Consider the following example:
        - If a typical household reduced peak demand by only 10% during the summer peak periods (1pm-6pm), and that reduction could be applied across Unitil's entire Massachusetts customer base, there would be the following benefits:
            - Unitil customer participating on demand response would save approximately $xxx,xxx by not having to purchase "peak" electricity at a premium price. This savings could be passed back to the customers in the form of lower rates.
            - From Unitil's perspective if as a whole the utility can "flatten" is demand for electricity this would provide the opportunity for reduce costs that would then be shared with customers through reduced energy component prices.
            - Avoided greenhouse gas emissions of over **95 tons of CO_2**.
            - Increased electric grid reliability, reducing the potential for power instability.

Insert #4: *General Energy Efficiency Sheet*

Energy Efficiency Measures

APPENDIX C
Energy Savings Management (ESM) Educational Component – Simple Product

- Lighting
  - Replace incandescent light bulbs with CFL's
  - Replace outdoor lighting with CFL's, LED's, or solar powered fixtures
  - Visit www.energystar.gov for a complete list of available energy efficient lighting
- Water heating can account for 14%–25% of the energy consumed in your home.
  - If replacing a water heater, choose an EnergyStar brand
  - Reduce set point temp on water heater to 120 deg F
  - Insulate hot water pipes
  - Install heat traps at hot water tank
  - Install times to turn off water heater during time when hot heater is not used, such as at night
  - Drain water heat recovery
  - Take short showers instead of baths
  - Install aerators on faucets, low flow showerheads to reduce hot water usage
- Appliances
  - If replacing appliances, choose EnergyStar
  - Air dry dishes instead of dishwasher drying cycle
  - Wash only full loads of dishes
  - Run clothes washer using cold water to conserve hot water
  - Dry heavier loads separately from lighter materials, routinely empty lint filter, check exhaust connection for lint. Improves energy efficiency and reduces fire hazard
  - "Don't keep your refrigerator or freezer too cold. Recommended temperatures are 37° to 40°F for the fresh food compartment of the refrigerator and 5°F for the freezer section. If you have a separate freezer for long-term storage, it should be kept at 0°F."
  - Unplug second refrigerators or freezers if they are not necessary
- Home Electronics
  - Turn off CPU and monitor when not in use
  - Plug home electronics, such as TVs and DVD players, into power strips and turn the power strips off when the equipment is not in use to eliminate "phantom" loads

APPENDIX C
Energy Savings Management (ESM) Educational Component – Simple Product

- Other "smart" power strips are available too, where some outlets stay active for cable boxes that need to stay on to record

Insert #5: *Load Shifting Measures*

Load Shifting Measures

- Raise thermostat set point during on-peak times by 5 degrees or 10 degrees
- Wash and dry clothes during off peak hours
  - Or hang dry clothes
- Run dishwasher during off peak hours
- Avoid drying cycle of dishwashers, allow to air dry
- Minimize appliance usage during on-peak periods
  - Toaster ovens
  - Electric ovens and ranges
  - Home electronics (TV, CPU, Stereo, etc.)
    - Plug home electronics into a power strip, and turn off the power strip when not in use (reduce phantom loads)
  - Hair dryers
  - Dehumidifiers
- Use timer on pool filters and pumps to run only during off-peak periods
- Turn off spa's during on-peak periods
- Turn off waterbed heaters during on-peak periods
- If you have an electric water heater, add a timer to shut off the water heater during peak periods, and turn it back on during off-peak periods. Timers cost approximately $60 and can be installed by homeowners or licensed professionals
- If you have a well pump, minimize water usage during on-peak hours
  - Avoid car washing
  - Use flow restricting devices on faucets and showerheads
  - Minimize use of lighting, indoor and outdoor, during on-peak periods

APPENDIX C
Energy Savings Management (ESM) Educational Component – Simple Product

Insert #6: *Additional References & Resources*

For more educational resources please visit the following websites:

Visit the U.S. Department of Energy, Energy Efficiency and Renewable Energy (DOE EERE) website at http://apps1.eere.energy.gov/consumer/

DOE EERE – Energy Saving Lighting Reference
http://apps1.eere.energy.gov/consumer/your_home/lighting_daylighting/index.cfm/mytopic=11980

DOE EERE – Appliances and Home Electronic

http://apps1.eere.energy.gov/consumer/your_home/ appliances/ index.cfm/mytopic=10020

DOE EERE Energy Savers (general energy efficiency information)
http://www1.eere.energy.gov/consumer/tips/

EnergyStar website, for appliance and lighting product information

http://www.energystar.gov/

Learn about renewable technologies

http://apps1.eere.energy.gov/consumer/

Fitchburg Gas and Electric Light Company
May and September Percent of Annual Peaks 2006-2008

Year	May Peak kW	May % Annual Peak	Sept Peak kW	Sept % Annual Peak	Summer Peak kW	Month of Summer Peak
2006	77,461	76.6%	74,331	73.5%	101,165	August
2007	73,621	79.2%	82,697	88.9%	93,009	June
2008	70,074	73.5%	79,255	83.1%	95,356	June

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Fitchburg Gas and Electric Light Company
Top 75 system load hours - Summer 2008

Date	Hour Ending	Load kW
6/10/08	17	95,356
6/10/08	18	94,674
6/10/08	16	94,238
6/10/08	14	94,178
6/10/08	15	94,050
6/10/08	19	93,648
6/10/08	21	93,050
6/10/08	13	93,017
6/10/08	20	92,708
6/10/08	12	91,150
6/10/08	22	90,124
6/9/08	17	88,783
6/9/08	18	88,390
6/9/08	19	88,135
6/10/08	11	87,694
6/9/08	20	87,243
6/9/08	16	87,033
6/9/08	15	86,989
6/9/08	21	86,226
7/18/08	17	85,858
6/9/08	14	85,582
7/18/08	16	85,450
6/9/08	13	84,986
7/18/08	18	84,675
7/18/08	14	84,498
7/18/08	15	84,424
6/10/08	10	83,956
7/31/08	17	83,864
7/18/08	13	83,838
6/9/08	22	83,640
6/9/08	12	83,594
7/17/08	15	83,404
7/17/08	17	83,308
7/9/08	14	83,289
7/31/08	16	83,243
7/31/08	15	83,199
7/9/08	15	83,139
7/18/08	19	83,099
7/9/08	16	83,017
7/9/08	13	82,990
7/17/08	18	82,904
7/31/08	18	82,897
7/17/08	16	82,834
6/10/08	23	82,819
7/9/08	17	82,291
7/18/08	20	82,139
7/18/08	12	81,915
7/31/08	14	81,913
7/17/08	19	81,618
7/17/08	14	81,386
7/9/08	12	81,384
7/18/08	21	81,200
7/31/08	19	80,360
6/11/08	17	80,320
6/9/08	11	80,312
7/8/08	17	80,119
7/17/08	20	79,561
7/31/08	13	79,554
7/18/08	11	79,522
7/16/08	18	79,443
7/8/08	18	79,422
7/16/08	17	79,380
6/11/08	15	79,254
7/31/08	21	79,234
6/11/08	16	79,200
7/9/08	18	79,099
7/8/08	16	79,077
6/11/08	14	79,033
7/17/08	21	79,019
7/30/08	16	79,016
7/17/08	13	78,795
7/30/08	15	78,703
8/1/08	17	78,581
6/11/08	18	78,547
6/10/08	9	78,518

Hour Ending	Occurrence
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	1
10	1
11	3
12	4
13	6
14	7 *
15	8 *
16	9 *
17	10 *
18	9 *
19	5
20	4
21	5
22	2
23	1
24	0

* On-Peak Period

Fitchburg Gas and Electric Light Company
Sample Calculations of Residential Default Service Pilot Program Pricing
based on an assumed 12¢/kWh Default Service Price
Pricing Multipliers based on Off-Peak Price

	Residential Load Profile (kWh)	Percentage Load	Hours	Pricing Multiplier	Revenue at Average Price	Revenue at Pilot Program Price	Pilot Program Price	Pilot Program Price Change vs Default Service Price	Pilot Program Price Change vs Off-Peak Price
Off-Peak Period	36,461,373	84.9%	1,888	1	$4,375,365	$3,576,476	$0.09809	-18.3%	0.0%
On-Peak Period	5,465,094	12.7%	280	2	$655,811	$1,072,136	$0.19618	63.5%	100.0%
Critical Peak Period	1,032,707	2.4%	40	5	$123,925	$506,489	$0.49045	308.7%	400.0%
Total	42,959,174	100.0%	2,208		$5,155,101	$5,155,101	$0.12000		

Assumed Residential Default Service Price $0.12000 per kWh

	Residential Load Profile (kWh)	Percentage Load	Hours	Pricing Multiplier	Revenue at Average Price	Revenue at Pilot Program Price	Pilot Program Price	Pilot Program Price Change vs Default Service Price	Pilot Program Price Change vs Off-Peak Price
Off-Peak Period	36,461,373	84.9%	1,888	1	$4,375,365	$3,377,380	$0.09263	-22.8%	0.0%
On-Peak Period	5,465,094	12.7%	280	2	$655,811	$1,012,452	$0.18526	54.4%	100.0%
Critical Peak Period	1,032,707	2.4%	40	8	$123,925	$765,269	$0.74103	517.5%	700.0%
Total	42,959,174	100.0%	2,208		$5,155,101	$5,155,101	$0.12000		

Assumed Residential Default Service Price $0.12000 per kWh

	Residential Load Profile (kWh)	Percentage Load	Hours	Pricing Multiplier	Revenue at Average Price	Revenue at Pilot Program Price	Pilot Program Price	Pilot Program Price Change vs Default Service Price	Pilot Program Price Change vs Off-Peak Price
Off-Peak Period	36,461,373	84.9%	1,888	1	$4,375,365	$3,239,597	$0.08885	-26.0%	0.0%
On-Peak Period	5,465,094	12.7%	280	3	$655,811	$1,456,723	$0.26655	122.1%	200.0%
Critical Peak Period	1,032,707	2.4%	40	5	$123,925	$458,781	$0.44425	270.2%	400.0%
Total	42,959,174	100.0%	2,208		$5,155,101	$5,155,101	$0.12000		

Assumed Residential Default Service Price $0.12000 per kWh

	Residential Load Profile (kWh)	Percentage Load	Hours	Pricing Multiplier	Revenue at Average Price	Revenue at Pilot Program Price	Pilot Program Price	Pilot Program Price Change vs Default Service Price	Pilot Program Price Change vs Off-Peak Price
Off-Peak Period	36,461,373	84.9%	1,888	1	$4,375,365	$3,075,380	$0.08435	-29.7%	0.0%
On-Peak Period	5,465,094	12.7%	280	3	$655,811	$1,382,881	$0.25304	110.9%	200.0%
Critical Peak Period	1,032,707	2.4%	40	8	$123,925	$696,840	$0.67477	462.3%	700.0%
Total	42,959,174	100.0%	2,208		$5,155,101	$5,155,101	$0.12000		

Assumed Residential Default Service Price $0.12000 per kWh

Appendix E
Attachment 1

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Sheet 1

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

RESIDENTIAL DEFAULT SERVICE TOU/CPP PILOT

SCHEDULE DS-P

PURPOSE

This Schedule is for the purpose of implementing Time of Use and Critical Peak Period Default Service Rates through a Pilot Program. The Pilot Program is filed with the M.D.P.U. pursuant to Section 85 of the Green Communities Act. A specific objective of the Pilot shall be to reduce, for those customers who actively participate in the pilot, peak and average loads by a minimum of 5 per cent.

AVAILABILITY

Service is available under this Schedule for residential customers on rate Schedule RD-1 Residential Delivery Service or RD-2 Low Income Residential Delivery Service who have central or whole house air conditioning and who choose to participate in this Pilot Program and are not receiving Generation Service from a Competitive Supplier.

DEFAULT SERVICE PILOT CHARGES – MONTHLY

The Charges for Default Service under this Schedule are shown below:

Default Service Charges:

Off-Peak kWh ..... $_____ per kWh
On-Peak kWh ..... $_____ per kWh
Critical Peak kWh ..... $_____ per kWh

These rates were developed based on the following multipliers applied to the residential Fixed DS price under Schedule DS which would otherwise be applicable to customers on this Schedule:

Off-Peak kWh ..... 0.502 times the Fixed DS price
On-Peak kWh ..... 3 times the Fixed DS price
Critical Peak kWh ..... 8 times the Fixed DS price

For the purposes of billing under the DS-P rate, "On-Peak" is defined to be between the hours of 1:00 P.M. and 6:00 P.M. (local time) for all non-holiday weekdays, Monday through Friday. "Off-Peak" is defined to be between the hours of 6:00 P.M. and 12:00 A.M. (local time) and between the hours of 12:00 A.M. and 1:00 P.M. (local time) during non-holiday weekdays and all-day for weekends, Saturday and Sunday, and all-day for official Federal and Massachusetts holidays that occur on a weekday. "Critical Peak" is defined to be between the hours of 1:00 P.M. and 6:00 P.M. (local time) for non-holiday weekdays, Monday through

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Sheet 2

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

RESIDENTIAL DEFAULT SERVICE TOU/CPP PILOT

SCHEDULE DS-P (Continued)

Friday, on those dates which are initiated by the Company. A maximum of 8 critical peak day events will be called during the term of this Pilot.

CRITICAL PEAK DAY NOTIFICATION

Customers will be notified of when a Critical Peak Day will occur through a variety of methods which may include the internet notification, voice messages, or text messages. Notification will be given by 3:00 P.M. of the day preceding the event.

TERM OF CONTRACT

The term of contract under this Schedule shall be for the three month period June 1 to August 31, 2010. Upon completion of the program, Customers will return to the Residential Fixed or Variable Default Service Charges, whichever the Customer received prior to participation in the Pilot.

DEFAULT SERVICE TERMS AND CONDITIONS

The Company's Default Service Tariff, Schedule DS, in effect from time to time, where not inconsistent with any specific provisions hereof, are a part of this Schedule.

TERMS AND CONDITIONS

The Company's Terms and Conditions in effect from time to time, where not inconsistent with any specific provisions hereof, are a part of this Schedule.

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Sheet 1

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS

1. General

This Tariff may be revised, amended, supplemented or supplanted in whole or in part from time to time according to the procedures provided in MDPU regulations and Massachusetts law. In case of conflict between this Tariff and any orders or regulations of the MDPU, said orders or regulations shall govern.

2. Definitions

A. "Company" shall mean Fitchburg Gas and Electric Light Company.

B. "Competitive Supplier" shall mean any entity licensed by the MDPU to sell electricity to retail Customers in Massachusetts, with the following exceptions: (1) a Distribution Company providing Default Service to its distribution Customers, and (2) a municipal light department that is acting as a Distribution Company.

C. "Customer" shall mean any person, partnership, corporation, or any other entity, whether public or private, who obtains Distribution Service at a Customer Delivery Point and who is a Customer of record of the Company.

D. "Customer Delivery Point" shall mean the Company's meter or a point designated by the Company located on the Customer's premises.

E. "Default Service" shall mean the service provided by the Distribution Company to a Customer who is not receiving Generation Service from a Competitive Supplier in accordance with the provisions set forth in this tariff.

F. "Distribution Company" shall mean an electric company organized under the laws of Massachusetts that provides Distribution Service in Massachusetts.

G. "Distribution Service" shall mean the delivery of electricity to Customers by the Distribution Company.

H. "Generation Service" shall mean the sale of electricity, including ancillary services such as the provision of reserves, to a Customer by a Competitive Supplier.

I. "MDPU" shall mean the Massachusetts Department of Public Utilities.

3. Availability

Default Service shall be available to any Customer who is not receiving Generation Service from a Competitive Supplier.

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS (continued)

4. Rates

Fixed Pricing Option:

This pricing option is available to all customers, but is not available to GD-3 customers when their monthly rate is determined by Market Based Pricing.

Effective January 1, 2001, all residential customers on Schedules RD-1 and RD-2 and small general service customers on Schedule GD-1 receiving Default Service will automatically be placed on this fixed rate, unless the Customer elects the Variable Monthly Pricing Option.

The fixed rate will remain the same for three or six months at a time and will be based on the average monthly wholesale price over the three or six-month period that the Company pays to its Default Service provider. The rate is fixed for a period of three months for customers on Schedule GD-3, when applicable. The rate is fixed for six months for customers on Schedules RD-1, RD-2, GD-1, GD-2, GD-4, GD-5 and SD.

Customers assigned to this Fixed Pricing Option may choose the Variable Monthly Pricing Option. Customers electing the Variable Monthly Pricing Option will not have the opportunity to switch back to the Fixed Pricing Option for as long as the Customer continues to receive uninterrupted Default Service.

Monthly bills will be recalculated for Customers who are on the Fixed Pricing Option for Default Service and decide to switch to a competitive supplier before the three or six-month period is over. The electric bill for the period of the fixed three or six month rate will be recalculated using the monthly variable rate for that period. This ensures that all consumers pay the actual cost of electricity they have used. This adjustment may be a credit or a debit, and will be reflected on the first bill after the switch is effective.

Residential customers on Schedules RD-1 and RD-2 and small general service customers on Schedule GD-1 who switch to a competitive supplier and later return to Default Service will be initially placed on the Fixed Pricing Option unless the Customer elects the Variable Monthly Pricing Option.

The rates for Fixed Pricing Option Default Service shall be as provided in Schedule SR as in effect from time to time.

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Sheet 3

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS (continued)

Variable Monthly Pricing Option:

This option is available to all customers, but is not available to GD-3 customers when their monthly rate is determined by Market Based Pricing.

Effective January 1, 2001, general service customers on Schedules GD-2, GD-3 (when applicable), GD-4, and GD-5 and outdoor lighting customers on Schedule SD receiving Default Service will automatically be placed on this variable monthly rate option, unless the Customer elects the Fixed Pricing Option.

The variable rate will change from month to month reflecting the monthly wholesale price that the Company pays to its Default Service provider.

Customers assigned to the Variable Monthly Pricing Option may choose the Fixed Pricing Option. Customers electing the Fixed Pricing Option will not have the opportunity to switch back to the Variable Monthly Pricing Option for as long as the Customer continues to receive uninterrupted Default Service.

General service customers on Schedules GD-2, GD-3 (when applicable), GD-4, and GD-5 and outdoor lighting customers on Schedule SD who decide to switch to a competitive supplier and later return to Default Service will be initially placed on the Variable Monthly Pricing Option, unless the Customer elects the Fixed Pricing Option.

The rates for Variable Monthly Pricing Option Default Service shall be as provided in Schedule SR as in effect from time to time.

The rate(s) for Default Service are established through a competitive bidding process, but in no case shall exceed the average monthly market price for electricity, as determined by the MDPU.

Large General Service GD-3 - Market Based Pricing:

Default Service prices for Customers on Schedule GD-3 may be determined monthly on an after the fact basis. If this is the case, "MARKET" shall be shown in the Variable Monthly Pricing Option shown in Schedule SR and the Fixed Pricing Option will not be applicable to GD-3 customers during that month, indicated by "N/A" in the Fixed Monthly Pricing Option shown in Schedule SR. The monthly price will be determined using the ISO-New England real time hourly locational marginal prices for the West Central Massachusetts load zone weighted by the wholesale hourly kWh volumes of the Company's Schedule GD-3 Default Service Customers and adjusted for the distribution losses shown in the Terms and Conditions for Competitive Suppliers, Appendix A. The monthly price will also include a

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FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS (continued)

retail Supplier Costs Adder for capacity, ancillary services, and other supplier costs established through a quarterly competitive bidding process, plus the estimated retail cost of Renewable Energy Certificates and the Default Service Costs Adder.

Customers will be notified of changes in Default Service rates in advance of their effective dates in accordance with guidelines set forth by the MDPU, as may be amended from time to time. Such notifications will be made in a variety of manners including a toll free number, the Company's website, bill inserts, and bill messages. Notification of rates will be made via the Company's website at www.unitil.com and a toll free number 30 days in advance of the effective date, but this information will not be available to GD-3 customers when their monthly rate is determined by Market Based Pricing. Default Customers will receive 60 day notification of upcoming rate changes via a bill message and 30 day notification of the new rates via a bill message. All Customers will receive a bill insert explaining Default Service in the billing cycle prior to the rate change.

5. Billing

Each Customer receiving Default Service shall receive one bill from the Company, reflecting unbundled charges for their electric service.

6. Initiation of Default Service

Default service may be initiated in any of the following manners:

A. A Customer who is receiving Generation Service from a Competitive Supplier notifies the Company that he wishes to terminate such service and receive Default Service. In this instance, Default Service shall be initiated within two (2) business days of such notification for residential Customers. For other Customers, Default Service shall be initiated concurrent with the Customer's next scheduled meter read date, provided that the Customer has provided such notification to the Company two (2) or more business days before the next scheduled meter read date, in accordance with the Company's Terms and Conditions for Competitive Suppliers. If the Customer provided such notification fewer than two (2) days before the Customer's next scheduled meter read date, Default Service shall be initiated concurrent with the Customer's subsequent scheduled meter read date;

B. A Competitive Supplier notifies the Company that it shall terminate Generation Service to a Customer. In this instance, Default Service shall be initiated for the Customer concurrent with the Customer's next scheduled meter read date, provided that the notice of termination of Generation Service is received by the Company two (2) or more business days before the next scheduled meter read date, in accordance with the Company's Terms and Conditions for Competitive Suppliers. If the notice of termination is received fewer than two (2) days before the Customer's next scheduled meter read date,

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FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS (continued)

Default Service shall be initiated concurrent with the Customer's subsequent scheduled meter read date;

C. A Competitive Supplier ceases to provide Generation Service to a Customer, without notification to the Company. In this instance, Default Service to the Customer shall be initiated immediately upon the cessation of Generation Service.

7. Termination of Default Service

Default Service may be terminated by a Customer concurrent with the Customer's next scheduled meter read date provided that notice of initiation of Generation Service by a Competitive Supplier is received by the Company two (2) or more business days before the next scheduled meter read date, in accordance with the Company's Terms and Conditions for Competitive Suppliers.

If the notice of initiation of Generation Service by the Competitive Supplier is received by the Company fewer than two days before the Customer's next scheduled meter read date, Default Service shall be terminated concurrent with the Customer's subsequent scheduled meter read date.

There shall be no fee for terminating Default Service.

8. Reconciliation of Default Service Costs

At the end of each calendar year, the Company shall reconcile recoveries with the cost of Default Service pursuant to the Company's Default Service Adjustment - Schedule DSA, MDTE No. 101. These costs include the costs billed to FG&E by its Default Service providers, the cost of Renewable Energy Certificates purchased for Default Service in compliance with 225 CMR 14.00 – Renewable Energy Portfolio Standard, and the FERC approved costs billed to the Company by ISO-New England for the operation of the New England Power Pool ("NEPOOL") Generation Information System ("GIS"). GIS costs are billed to the Company pursuant to the Attribute Laws, as defined in the NEPOOL cost allocation document. Renewable Energy Certificates are the title or claim for the generation attributes associated with a Renewable Generator that is compliant with the definition of a New Renewable Generation Source as found in 225 CMR 14.00 – Renewable Energy Portfolio Standard. The February 29, 2008 Base Rate Reduction balance, including any associated prior period adjustments and revenue, shall also be included.

Recoveries and costs associated with the Default Service Costs Adder shall be excluded from this reconciliation since the Default Service Costs Adder is separately reconciled as discussed below.

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FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS (continued)

9. Default Service Costs Adder

Effective June 1, 2005, the Default Service rates will include the Default Service Costs Adder. The Company shall perform an annual reconciliation of recoveries with the costs of the Default Service Costs Adder and credit or charge any imbalances, with interest, in the computation of the Default Service Costs Adder for the following twelve month period. Interest shall be calculated using the prime rate after tax (i.e. prime rate * (1 – tax rate)). The tax rate shall be the combined federal and state income tax rate. The prime rate is to be fixed on a quarterly basis and established as reported in The WALL STREET JOURNAL on the first business day of the month preceding the calendar quarter; if more than one rate is reported, the average of the reported rates shall be used. The Company may file to change the factor at any time should significant over- or under-recoveries occur or be expected to occur.

The Default Service Costs Adder shall include the following costs associated with Default Service:

A. Cost of Working Capital, calculated as follows,

Cost of Working Capital = Working Capital Requirement * Tax Adjusted Cost of Capital,

where:

Working Capital Requirement = Supplier Costs * Number of Days Lag/365

Number of Days Lag is the number of days lag to calculate the purchased power working capital requirement as defined in the Company's most recent Lead Lag Study approved by the Department,

Tax Adjusted Cost of Capital = Cost of Debt + (Cost of Equity/(1-Effective Tax Rate))

where:

The Cost of Debt is the debt component of the rate of return as approved by the Department in the Company's most recent base rate case,

The Cost of Equity is the equity component of the rate of return as approved by the Department in the Company's most recent base rate case, and

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FITCHBURG GAS AND ELECTRIC LIGHT COMPANY

DEFAULT SERVICE

SCHEDULE DS (continued)

The Effective Tax Rate is the combined effective state and federal income tax rate;

B. Bad Debt Costs which shall equal the uncollected costs associated with electric supply.

C. Administrative cost of compliance with Massachusetts Renewable Energy Portfolio Standard, 225 CMR 14. Annually, these costs shall be $3,100.70.

D. Cost of the design and implementation of competitive bidding process, including evaluation of supplier bids and contract negotiations, and ongoing administration and execution of contracts with suppliers, including accounting activities necessary to track payments made to suppliers. Annually, these costs shall be $69,817.68.

E. Cost of compliance with MDPU's regulatory requirements including required communication with Default Service customers pursuant to 220 CMR 11.06. Annually, these costs shall be $57,923.17.

F. Incremental costs of the design, implementation, and analysis and reporting of the Company's Smart Grid Pilot Programs filed in compliance with section 85 of the Green Communities Act. Incremental costs shall include such items as consultant costs, contractor costs, external programmer costs and equipment costs that are directly related to these pilot programs. Costs associated with existing internal resources shall not be considered incremental.

Annually, the costs in C., D. and E. above sum to $130,841.55 and shall be fixed until the next general distribution rate case unless otherwise proposed to be adjusted by the Company, subject to approval by the MDPU. However, at such time that the migration of the Company's customers from Default Service to competitive supply increases to a significant level as compared to the level at the time these costs were developed, the costs detailed above may be adjusted to reflect the decline in Default Service customers.